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DOCUMENTATION

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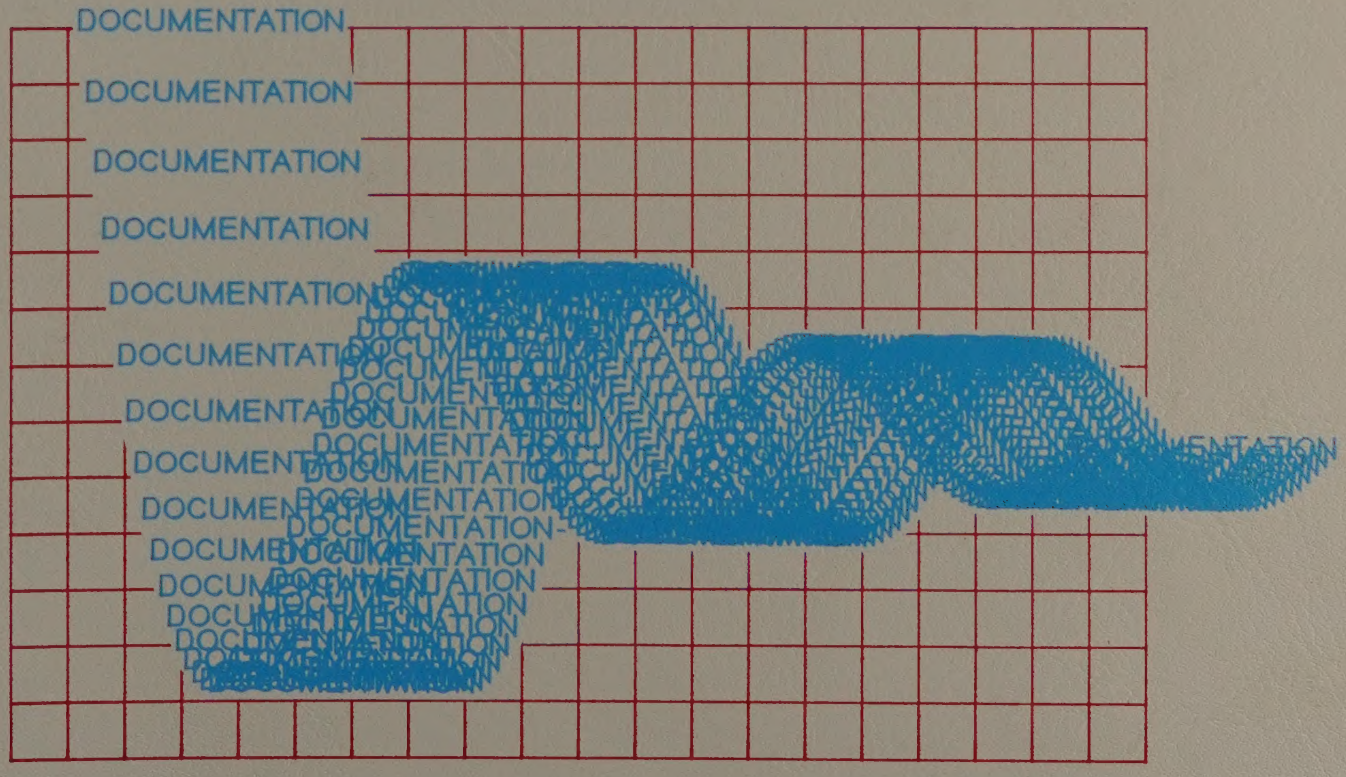

ROHDE&SCHWARZ

Test and Measurement
Division

Service Manual Instrument

SIGNAL ANALYZER

FSIQ3
1119.5005.03/.13

FSIQ7
1119.5005.07./17

FSIQ26
1119.6001.26/.27

FSIQ40
1119.6001.40

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RE

Tabbed Divider Overview

Index

Safety Instructions

Certificate of Quality

Spare Parts Express Service
List of R&S Representatives

Contents of Manuals for Signal Analyzer FSIQ
Service and Repair

Tabbed Divider

1 Chapter 1: Performance Test

2 Chapter 2: Adjustment

3 Chapter 3: Functional Description/Selftest

4 Chapter 4: Firmware Update/Options

5 Chapter 5: Documents

M

C

F

H

S

T

Index

1

1st IF image frequency rejection 1.8
1st IF rejection 1.9

2

2nd IF image frequency rejection 1.9

3

3-dB bandwidths 1.15

A

Absolute accuracy at 120 MHz 1.30
Adjustment 2.1
AM demodulation 1.37, 1.39
Analog demodulation 1.37
Attenuator 1.21
Attenuator, 1-dB 1.29
Audio frequency measurement 1.39, 1.41
Audio output function 1.42

C

Cable list 5.3
Calibration source at 120 MHz 1.4
Carrier Power 1.41
Carrier power measurement 1.39
Checking the rated specifications 1.1
Circuit diagram 5.5

D

Demodulation, analog 1.37
Demodulation, digital 1.30
Digital demodulation 1.30
Display linearity 1.20, 1.30
Documents 5.1
Dynamic range for burst measurements 1.31

E

External mixer output 1.28

F

Firmware update 4.1
FM demodulation 1.38, 1.40
Frequency accuracy of the reference oscillator 1.5
Frequency response 1.18

I

IF filters 1.14
IF gain switching 1.22
Immunity to interference 1.8

L

Level error 1.14
LO feedthrough 1.17

M

Measuring equipment 1.1

N

Noise display 1.17
Non-linearities 1.10

O

Option
  installation 4.2
  list 4.2
Ordering of spare parts 5.1

P

Performance test report 1.43
Phase noise 1.24
PM demodulation 1.38, 1.40
Power cables 5.3

R

Replacement parts
  ordering 5.2
Residual error (FSK signals) 1.36
Residual error (no FSK signals) 1.32
Residual FM 1.38, 1.40
Return loss at the RF input 1.5

S

Second-order harmonic distortion 1.12
Self test 3.6
Shape Factor 1.16
Shipping
  instrument 5.1
  module 5.1
SINAD with FM 1.42
SINAD with PM 1.42
Softkey
  FIRMWARE UPDATE 4.1
  RESTORE FIRMWARE 4.1
Software installation 4.1
Software update 4.1
Spare parts
  ordering 5.1
Specifications 1.1
Spurious AM 1.37, 1.39
Spurious PM 1.38, 1.41

T

Test instructions 1.4
Third-order intercept 1.10
Tracking generator 1.26

Safety Instructions

This unit has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards.

To maintain this condition and to ensure safe operation, the user must observe all instructions and warnings given in this operating manual.

Safety-related symbols used on equipment and documentation from R&S:

Observe operating instructions

Weight indication for units >18 kg

PE terminal

Ground terminal

Danger! Shock hazard

Warning! Hot surfaces

Ground

Attention! Electrostatic sensitive devices require special care

1. The unit may be used only in the operating conditions and positions specified by the manufacturer. Unless otherwise agreed, the following applies to R&S products:

   IP degree of protection 2X, Pollution severity 2, overvoltage category 2, altitude max. 2000 m.

   The unit may be operated only from supply networks fused with max. 16 A.

2. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures should be taken to avoid any hazards.

   (using, for example, appropriate measuring equipment, fusing, current limiting, electrical separation, insulation).

3. If the unit is to be permanently wired, the PE terminal of the unit must first be connected to the PE conductor on site before any other connections are made. Installation and cabling of the unit to be performed only by qualified technical personnel.

4. For permanently installed units without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused such as to provide suitable protection for the users and equipment.

5. Prior to switching on the unit, it must be ensured that the nominal voltage set on the unit matches the nominal voltage of the AC supply network.

   If a different voltage is to be set, the power fuse of the unit may have to be changed accordingly.

6. Units of protection class I with disconnectible AC supply cable and appliance connector may be operated only from a power socket with earthing contact and with the PE conductor connected.

7. It is not permissible to interrupt the PE conductor intentionally, neither in the incoming cable nor on the unit itself as this may cause the unit to become electrically hazardous.

   Any extension lines or multiple socket outlets used must be checked for compliance with relevant safety standards at regular intervals.

8. If the unit has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply.

   If units without power switches are integrated in racks or systems, a disconnecting device must be provided at system level.

9. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

   Prior to performing any work on the unit or opening the unit, the latter must be disconnected from the supply network.

   Any adjustments, replacements of parts, maintenance or repair may be carried out only by authorized R&S technical personnel.

   Only original parts may be used for replacing parts relevant to safety (eg power switches, power transformers, fuses). A safety test must be performed after each replacement of parts relevant to safety.

   (visual inspection, PE conductor test, insulation-resistance, leakage-current measurement, functional test).

continued overleaf

10. Ensure that the connections with information technology equipment comply with IEC950 / EN60950.
11. Lithium batteries must not be exposed to high temperatures or fire.

    Keep batteries away from children.

    If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type (see spare part list).

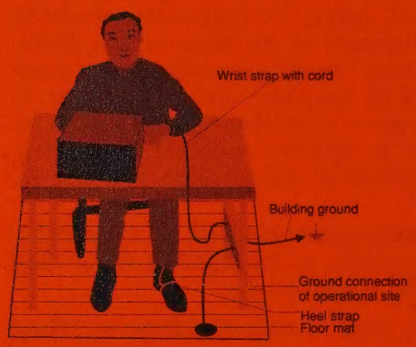
    Lithium batteries are suitable for environmentally-friendly disposal or specialized recycling. Dispose them into appropriate containers, only.

    Do not short-circuit the battery.
12. Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.
13. Electrostatics via the connectors may damage the equipment. For the safe handling and operation of the equipment, appropriate measures against electrostatics should be implemented.
14. Any additional safety instructions given in this manual are also to be observed.

The instrument contains components which are hazardous to electrostatic exposure and which are marked by the following symbol:

ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.

- To avoid damage of electronic components, the operational site must be protected against electrostatic discharge (ESD).



The following two methods of ESD protection may be used together or separately:

- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

The batteries used in the instrument are high-power lithium cells with a life utility of approx. 5 years. If you do not handle them properly, there is a danger of explosion. Therefore, observe the following safety instructions:

- Avoid short-circuit and loading of the battery
- Do not expose lithium batteries to high temperature or fire.
- Do not open used batteries
- Keep batteries away from children.
- Replace battery only by R&S type battery (R&S ordering number 0565.1687.00)
- Make sure to connect the battery to the appropriate terminals when replacing
- Lithium batteries are suitable for environmentally-friendly disposal or specialized recycling. Dispose them into appropriate containers, only.

Certified Quality System

ISO 9001

DQS REG. NO 1954-04

Qualitätszertifikat

Sehr geehrter Kunde,

Sie haben sich für den Kauf eines Rohde & Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Qualitätsmanagementsystems entwickelt, gefertigt und geprüft. Das Rohde & Schwarz-Qualitätsmanagementsystem ist nach ISO 9001 zertifiziert.

Certificate of quality

Dear Customer,

You have decided to buy a Rohde & Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards.
The Rohde & Schwarz quality management system is certified according to ISO 9001.

Certificat de qualité

Cher client,

Vous avez choisi d'acheter un produit Rohde & Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité.
Le système de gestion qualité de Rohde & Schwarz a été homologué conformément à la norme ISO 9001.

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Contents of Manuals for Signal Analyzer FSIQ

Service Manual - Instrument

The service manual - instrument informs on how to check compliance with rated specifications (performance test), on instrument function, and on selftest of FSIQ.

The service manual comprises the following chapters:

Chapter 1 provides all the information necessary to check FSIQ for compliance with rated specifications. The required test equipment is included, too.

Chapter 2 describes the adjustment.

Chapter 3 describes the function of the instruments and the selftest.

Chapter 4 contains information on the extension and modification of FSIQ by installing instrument software and retrofitting options.

Chapter 5 describes the shipping of the instrument and ordering of spare parts. It contains the documents for the basic instrument.

Service Manual

The service manual modules is not delivered with the instrument but may be obtained from your R&S service department using the order number 1065.6016.24.

The service manual informs on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the FSIQ by the replacement of modules.

The service manual contains information about the individual modules of FSIQ. This comprises the test and adjustment of the modules, fault detection within the modules and the interface description.

Operating Manual

In the operating manual for FSIQ you will find information about the technical specifications of FSIQ, the controls and connectors on the front and rear panel, necessary steps for putting the instrument into operation, the basic operating concept, manual and remote control.

For introduction typical measurement tasks are explained in detail using the functions of the user interface and program examples.

The operating manual further provides hints on preventive maintenance and fault diagnosis by means of warnings and error messages output by the unit.

Service and Repair

Please contact your Rohde & Schwarz support center or our spare parts express service if you need service or repair of your equipment or to order spare parts and modules.

The list of the Rohde & Schwarz representatives and the address of our spare parts express service are provided at the beginning of this service manual.

We require the following information in order to answer your inquiry fast and correctly and to decide whether the warranty still applies for your instrument:

- Instrument model
- Serial number
- Firmware version
- Detailed error description in case of repair
- Contact partner for checkbacks

Rohde & Schwarz offers the following calibrations:

- Calibration on R&S-type test systems. The calibration documentation meets the requirements of the quality management system ISO 9000.
- Calibration at an R&S calibration center approved by the German Calibration Service (DKD). The calibration documentation consists of the DKD calibration certificate.

Refer to Chapter 5 for a detailed description on shipping of the instrument and ordering of spare parts.

Contents - Chapter 1 "Performance Test"

1 Checking the Rated Specifications

Measuring Equipment and Accessories **1.1**

Test Instructions **1.4**

Checking the Calibration Source at 120 MHz 1.4
Checking the Frequency Accuracy of the Reference Oscillator 1.5
Checking the Return Loss at the RF Input 1.5
Checking Immunity to Interference 1.8
1st IF Image Frequency Rejection 1.8
2nd IF Image Frequency Rejection 1.9
1st IF Rejection 1.9
Checking Non-linearities 1.10
Third-Order Intercept 1.10
Second-Order Harmonic Distortion 1.11
Checking IF Filters 1.13
Checking the Level Error 1.13
Checking 3-dB Bandwidths 1.14
Checking the Shape Factor 1.15
Checking LO Feedthrough, Noise Display 1.16
LO Feedthrough 1.16
Noise Display 1.16
Checking the Frequency Response 1.17
Checking the Display Linearity 1.19
Checking the Attenuator 1.20
Checking the IF Gain Switching 1.21
Checking the Phase Noise 1.23
Checking the Tracking Generator – Option FS-B8/B9/B10/B11 ..... 1.25
Checking the Output Level 1.25
Checking the Frequency Response 1.25
Checking the I/Q Modulator 1.26
External Mixer Output - Option FSE-B21 ..... 1.27
Checking the LO Level 1.27
1 dB Attenuator - Option FSE-B13 ..... 1.28
Digital Demodulation 1.29
Absolute Accuracy at 120 MHz 1.29
Display Linearity 1.29
Checking the Dynamic Range for Burst Measurements 1.30
Checking the Residual Error (no FSK signals) 1.31
Checking the Residual Error (FSK signals) 1.35
Analog Demodulation 1.36
REAL TIME OFF 1.36
Measurement Error with AM Demodulation 1.36
Spurious AM 1.36
Measurement Error with FM Demodulation 1.37
Residual FM 1.37
Measurement Error with PM Demodulation 1.37
Spurious PM 1.37
Error of Carrier Power Measurement 1.38
Error of Audio Frequency Measurement 1.38

REAL TIME ON 1.38
Measurement Error with AM Demodulation 1.38
Spurious AM 1.38
Measurement Error with FM Demodulation 1.39
Residual FM 1.39
Measurement Error with PM Demodulation 1.39
Spurious PM 1.39
Carrier Power 1.40
Audio Frequency Measurement 1.40
SINAD with AM 1.40
SINAD with FM 1.41
SINAD with PM 1.41
Audio Output Function 1.41

Performance Test Report 1.42

Test Instructions for Instrument Models 03/07/26 with Option FSE-B22 ..... 1.66

Checking the Calibration Source at 120 MHz 1.66
Checking IF Filters 1.67
Checking the Level Error 1.67
Checking the Frequency Response 1.68
Checking the Display Linearity 1.70
Checking the Attenuator 1.71

Performance Test Report for Instrument Models 03/07/26 with Option FSE-B22 ..... 1.72

1 Checking the Rated Specifications

- Disconnect the instrument from the mains before opening the casing.
- Check the AC voltage selection setting of before switching on the instrument (230 V!).
- The rated specifications of the analyzer are tested after a warm-up time of at least 30 minutes and overall calibration. Only in this case can the compliance with the guaranteed data be ensured.
- Values given in the following sections are not guaranteed. Only the technical specifications of the data sheet are binding.
- Unless specified otherwise all settings are made after a PRESET.
- Conventions for setting the FSIQ during measurements:

  [**<KEY>**] Press a key on the front panel, eg [SPAN]

  [<SOFTKEY>] Press a softkey, eg [MARKER -> PEAK]

  [<nn unit>] Enter a value and terminate by entering the unit, eg [**12 kHz**]

  Successive entries are separated by [:], eg [**SPAN**: **15 kHz**]

Measuring Equipment and Accessories

Table 1-1 Measuring Equipment and Accessories

	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.	Use
1	Frequency counter	error < 1x10-9, frequency range up to 10 MHz	Advantest R5361B with option 23		1.5
2	Signal generator	FSIQ3: 10 MHz to 3,5 GHz FSIQ7: 10 MHz to 7 GHz FSIQ26: 10 MHz to 26,5 GHz FSIQ40: 10 MHz to 40 GHz	SMHU SMP02 SMP03 SMP04	0835.8011.58 1035.5005.02 1035.5005.03 1035.5005.04	1.5 1.8 1.10 1.17 1.29 1.30
3	Signal generator with I/Q modulation 9 kHz to 1.9 GHz	<-100 dBc/Hz at 100 Hz <-115 dBc/Hz at 1 kHz <-127 dBc/Hz at 10 kHz <-130 dBc/Hz at 100 kHz <-142 dBc/Hz at 1 MHz < -123 dBc/Hz at 10 kHz < -123 dBc/Hz at 100 kHz < -140 dBc/Hz at 1 MHz EVM < 0.5 % after calibration	SMHU58	0835.8011.58	1.4 1.10 1.11 1.13 1.17 1.19 1.20 1.21 1.23 1.28 1.31 1.35 1.66 1.67 1.68 1.70 1.71

	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.	Use
4	3-dB coupler (power combiner)	decoupling > 12 dB FSIQ3: 10 MHz to 3,5 GHz FSIQ7: 10 MHz to 7 GHz FSIQ26: 10 MHz to 26,5 GHz FSIQ40: 10 MHz to 40 GHz			1.10
5	6-dB divider (power splitter)	level imbalance 10 MHz to 2.2 GHz ≤ 0.10 dB 2.2 GHz to 7 GHz ≤ 0.2 dB 7 GHz to 18 GHz ≤ 0.3 dB 18 GHz to 26.5 GHz ≤ 0.4 dB 26,5 GHz to 40 GHz ≤ 0.4 dB FSIQ3: 10 MHz to 3,5 GHz FSIQ7: 10 MHz to 7 GHz FSIQ26: 10 MHz to 26,5 GHz FSIQ40: 10 MHz to 40 GHz			1.17
6	50-Ω termination	Return loss > 20 dB FSIQ3: up to 3,5 GHz FSIQ7: up to 7 GHz FSIQ26: up to 26,5 GHz FSIQ40: up to 40 GHz	RNA RNA Wiltron 28S50 Wiltron 28K50	0272.4510.50 0272.4510.50	1.16
7	Power meter	100 kHz to 26.5 GHz, error < 0.1 dB	NRVD with sensors NRV-Z7 (FSIQ3/B) NRV-Z6 (FSIQ26/40)	0857.8008.02 0828.5210.22 0828.5010.02	1.4 1.5 1.17 1.27 1.29 1.66 1.68
8	Power sensor (FSIQ3 / FSIQ7 / FSIQ26 / FSIQ40 / FSE-B21)	1 MHz to 3.5 GHz RSS ≤ 0.8% Meter noise ≤ 20 pW	NRV-Z4 or NRV-Z51	0828.3618.02/ 0857.9004.02	1.4 1.5 1.17 1.66 1.68
9	Second Power sensor (FSIQ7 / FSIQ26 / FSIQ40 / FSE-B21)	RSS referred to indicated Power: 3.5 GHz to 7 GHz ≤ 2 % 7 GHz to 26.5 GHz ≤ 3.5 % 26.5 GHz to 40 GHz ≤ 4 % FSIQ7: 10 MHz to 7 GHz FSIQ26: 50 MHz up to 26,5 GHz FSIQ40: 50 MHz up to 40 GHz FSIQ-B21: 7.5 GHz to 15.2 GHz maximum power > 40 mW RSS referred to indicated power ≤ 2.5 %	NRV-Z2 NRV-Z6 NRV-Z55	0828.3218.02 0828.5010.02 1081.2005.02	1.5 1.17 1.17 1.36
10	Reflection coefficient VSWR bridge (FSIQ3 / FSIQ7)	directivity > 30 dB FSIQ3 / FSIQ7 10 MHz to 3.5 GHz FSIQ7: 3.5 GHz to 7 GHz	ZRC Wiltron 87A50 (also required: adapter 34AN50, open/short 22NF50	1039.9492.55	1.5
11	Network analyzer (FSIQ26 / FSIQ40)	FSIQ26: 10 MHz to 26,5 GHz FSIQ40: 10 MHz to 40 GHz			1.5

	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.	Use
12	Step attenuator	variable attenuation 0 dB to 100 dB, 1-dB steps attenuation error < 0.05 dB (f = 5 MHz)	RSP	0831.3515.02	1.19 1.20 1.21 1.70 1.71
13	Attenuator (2 x)	fixed attenuation 10 dB FSIQ3: 10 MHz to 3,5 GHz FSIQ7: 10 MHz up to 7 GHz FSIQ26: 10 MHz up to 26,5 GHz FSIQ40: 10 MHz to 40 GHz FSIQ-B21: fixed attenuation 3 dB	 DNF DNF Wiltron 43KB-10 Wiltron 43KC-10	 0272.4210.50 0272.4210.50	1.10 1.27 1.28
14	Lowpass[1)]	cut-off frequency: 10 kHz, 40 kHz, 100 kHz, 20 MHz, 29 MHz, 108 MHz, 263 MHz, 454 MHz, 641 MHz, 1.1 GHz, 1.3 GHz, 1.8 GHz			1.11
15	N-connecting cables Tracking RF input	Attenuation up to 7 GHz < 0.1dB			1.25 1.25
16	2 DC sources for I and Q	can be set between ±0.5V	NGT35	0191.2019.02	1.26
17	2 DC voltmeters		URE	0350.5315.02	1.26
18	Arbitrary waveform generator	Sampling rate ≥ 40 MHz, can be calibrated	ADS (64-k memory) + ADS-B1	1012.4002.02 1013.5748.92	1.31 1.35
19	Control software for ADS		IQSIM V4.0 or higher		1.31 1.35
20	Attenuators, 3 dB (BNC, 2 required)		--		1.31
21	Arbitrary Waveform Generator	Sampling Rate ≥ 40 MHz, can be calibrated	AMIQ	1110.2003.02	1.31
22	Control software for AMIQ		WinIQSIM	1119.5192.00	1.31
23	Test files		FSIQ Test Data		1.31 1.35

1) The lowpass filters improve the harmonics suppression of the test signal. If the harmonics suppression at the signal generator output is already large enough, no filters are required for the frequency ranges concerned (see page 1.11 for harmonics suppression required).

Test Instructions

Checking the Calibration Source at 120 MHz

Note for instrument models 03/07/26: *See chapter "Test Instructions for Instrument Models 03/07/26 with Option FSE-B22" when option FSE-B22 is installed.*

Test equipment:

- signal generator (table 1-1, item 3):
  frequency 120 MHz
  level -40 dBm
- power meter (table 1-1, item 7)
- power sensor (table 1-1, item 8)
  frequency 120 MHz
  maximum power $P_{max} \geq 1$ µW
  meter noise ≤ 20 pW
  RSS ≤ 0.8% referred to indicated power
  impedance Z = 50 Ω

Power meter settings:

➢ connect power sensor to power meter and carry out function ´ZERO´ when no signal is applied to the power sensor.

➢ connect power sensor to RF output of signal generator.

Signal generator settings:

- frequency 120 MHz
- level –40 dBm ± 0.1 dB
  Use power meter for exact level adjustment.

Test setup:

➢ connect RF output of the signal generator to RF input of the FSIQ

FSIQ settings:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**FREQUENCY SPAN** : **15 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**LEVEL REF** : REF LEVEL : **-10 dBm**]
- [**INPUT** : RF ATTEN MANUAL : **20 dB**]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

➢ switch internal reference generator to RF input
[**CONFIGURATION SETUP** : SERVICE : INPUT CAL]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The reading ´Delta 1 [T1 FXD]´ displays the difference between the output level of the signal generator and the level of the calibration source.

Instrument models 03/07/26: ´Delta 1 [T1 FXD]´.....<0.3 dB

Instrument models 13/17/27/40: ´Delta 1 [T1 FXD]´.....<0.2 dB

Note: *The level of the calibration source can be adjusted with R22 on FracSyn module.*

Checking the Frequency Accuracy of the Reference Oscillator

Test equipment:

frequency counter (table 1-1, item 1):
error < $1x10^{-9}$
frequency range up to 10 MHz

Test setup:

- connect frequency counter to 10-MHz reference output of the FSIQ (rear panel)

FSIQ settings:

- [**CONFIGURATION SETUP** : REFERENCE INT / EXT]
toggle to internal reference (INT)

Measurement:

➢ measure frequency with frequency counter

nominal frequency .....10 MHz ± 1 Hz

Checking the Return Loss at the RF Input

Test equipment:

FSIQ3 / FSIQ7:

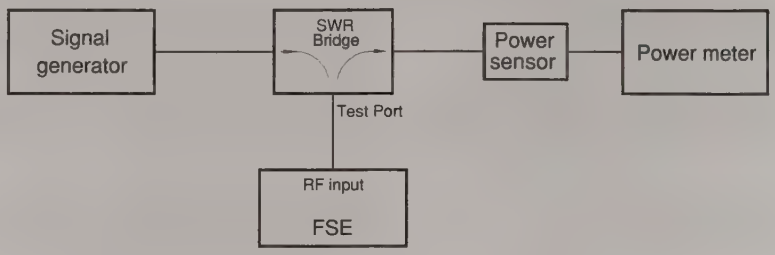
- signal generator (table 1-1, item 2)
  - frequency range FSIQ3: 10 MHz to 3.5 GHz
    FSIQ7: 10 MHz to 7 GHz
  - maximum level ≥ 0 dBm
- power meter (table 1-1, item 7)
- power sensor (table 1-1; FSIQ3: item 8; FSIQ7: item 9)
  - frequency range FSIQ3: 10 MHz to 3.5 GHz
    FSIQ7: 10 MHz to 7 GHz
- reflection coefficient bridge (table 1-1, item 10)
  - frequency range FSIQ3: 10 MHz to 3.5 GHz
    FSIQ7: 10 MHz to 7 GHz
  - directivity ≥ 30 dB

FSIQ26 / FSIQ40::

- network analyzer (table 1-1, item 11)
  - frequency range FSIQ3: 10 MHz to 26.5 GHz
    FSIQ7: 26.5 MHz to 40 GHz

Test setup:

FSIQ3 / FSIQ7:



FSIQ26 / FSIQ40:
Connect port 1 of network analyzer to RF input of the FSIQ.

Signal generator settings:
(FSIQ3 / FSIQ7)

- level 0 dBm
- frequency $\{f_{in}\}$

See table 1-2 (item 3) of performance test report for values of f_{in}.

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]

Calibration:

FSIQ3 / FSIQ7:
Use total reflection (OPEN or SHORT) at the test port of the SWR bridge as a reference:
Remove cable from RF input of the FSIQ and connect precision short or open to the cable. Determine reflected power with the power meter and store measured level L_{Ref} as reference. Repeat this procedure for every measurement over the whole frequency range.

FSIQ26 / FSIQ40:
See operating manual of the network analyzer for detailed information about calibration for S_{11} measurement.

Measurement

FSIQ3 / FSIQ7:

- Connect the RF input of the FSIQ to the test port of the SWR bridge.
- Measure reflected power L_r with the power meter. The return loss a_r of the RF input of the FSIQ can be calculated as

  $a_r = L_{Ref} - L_r$.

The SWR can be calculated as

$$s = \frac{10^{0.05a_r} + 1}{10^{0.05a_r} - 1} .$$

FSIQ26 / FSIQ40:

- Determine S_{11} of the FSIQ at the frequencies shown in table 1-2 (item 3) of performance test report. See operating manual of the network analyzer for detailed information about S_{11} measurement.

a_r / dB	s
6	3.0
7.4	2.5
8	2.3
9.5	2.0
10	1.9
12	1.7
14	1.5
16	1.4
18	1.3
20	1.2

Checking Immunity to Interference

Test equipment: signal generator (table 1-1, item 2):
- frequency range FSIQ3: 10 MHz to 3.5 GHz
  FSIQ7: 10 MHz to 7 GHz
  FSIQ26/FSIQ40: 10 MHz to 8 GHz
- maximum level ≥ -10 dBm

Test setup:
➢ connect RF output of the signal generator to RF input of the FSIQ.

Signal generator settings: level -10 dBm ± 0.5 dB

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **0 dB**]
- [**LEVEL REF** : REF LEVEL : **-30 dBm**]
- [**FREQUENCY SPAN** : **100 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **2 kHz**]

1st IF Image Frequency Rejection

Additional signal generator settings:
- frequency

FSIQ3	f_{in} + 8682.8 MHz
FSIQ7	f_{in} + 15.8828 GHz
FSIQ26 / FSIQ40	f_{in} + 15.8828 GHz (f_{in} < 7 GHz)

f_{in} + 2 x 1st IF

See table 1-2 (item 4) of performance test report for values of f_{in}

Additional FSIQ settings:
- [**FREQUENCY CENTER** : {f_{in}}]

See table 1-2 (item 4) of performance test report for values of f_{in}

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:
The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

Image frequency rejection = -10dBm – L_{dis}

See table 1-2 (item 4) of performance test report for limits of image frequency rejection.

2nd IF Image Frequency Rejection

Additional signal generator settings:

- frequency f_{in} + 2 x 2nd IF

f_{in} + 1482.8 MHz

See table 1-2 (item 5) of performance test report for values of f_{in}.

Additional FSIQ settings:

- [**FREQUENCY CENTER** : {f_{in}}]

See table 1-2 (item 5) of performance test report for values of f_{in}.

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The image frequency rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

Image frequency rejection = –10dBm – L_{dis}

See table 1-2 (item 5) of performance test report for limits of image frequency rejection.

1st IF Rejection

Additional signal generator settings:

- frequency = 1st IF

FSIQ3	4341.4 MHz
FSIQ7	7941.4 MHz
FSIQ26 / FSIQ40	7941.4 MHz (f_{in} < 7 GHz)
	741.4 MHz (f_{in} ≥ 7 GHz)

Additional FSIQ settings:

- [**FREQUENCY CENTER** : {f_{in}}]

See table 1-2 (item 6) of performance test report for values of f_{in}.

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The IF rejection is the difference between the output level of the signal generator and the level reading of marker 1 (L_{dis}):

IF rejection = –10dBm – L_{dis}

See table 1-2 (item 6) of performance test report for limits of image frequency rejection.

Checking Non-linearities

Third-Order Intercept

Test equipment:

- 2 signal generators FSIQ3: table 1-1, item 2 and 3;
  FSIQ7/26/40: table 1-1, 2 x item 2
  frequency range
  FSIQ3: 10 MHz to 3.5 GHz
  FSIQ7: 10 MHz to 7 GHz
  FSIQ26: 10 MHz to 26.5 GHz
  FSIQ40: 10 MHz to 40 GHz
  maximum level ≥ 0 dBm

- 2 attenuators (table 1-1, item 13)
  attenuation a_{ATT} = 10 dB
  frequency range
  FSIQ3: 10 MHz to 3.5 GHz
  FSIQ7: 10 MHz to 7 GHz
  FSIQ26: 10 MHz to 26.5 GHz
  FSIQ40: 10 MHz to 40 GHz

- 3-dB coupler (table 1-1, item 4)
  frequency range
  FSIQ3: 10 MHz to 3.5 GHz
  FSIQ7: 10 MHz to 7 GHz
  FSIQ26: 10 MHz to 26.5 GHz
  FSIQ40: 10 MHz to 40 GHz
  decoupling > 12 dB

Test setup:

- ➢ connect RF outputs of the signal generators via 10-dB attenuators the inputs of the 3-dB coupler
- ➢ connect output of the 3-dB coupler to RF input of the FSIQ.

Signal generator settings:
(both generators)

- frequency: generator 1 $f_{g1} = f_{in}$
  generator 2 $f_{g2} = f_{in}$ + 100 kHz

See table 1-2 (item 7) of performance test report for values of f_{in}

- level: 0 dBm

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **0 dB**]
- [**LEVEL REF** : **-10 dBm**]
- [**FREQUENCY SPAN** : **50 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **2 kHz**]
- [**FREQUENCY CENTER** : {f_{in}}]

See table 1-2 (item 7) of performance test report for values of f_{in}

- [**MARKER SEARCH** : PEAK]

➢ Adjust the output level of signal generator 1 until the level reading of marker 1 is -10 dBm ± 0.1 dB.

- [**FREQUENCY CENTER** : {f_{in} + 100 kHz}]

  See table 1-2 (item 7) of performance test report for values of f_{in}

- [**MARKER SEARCH** : PEAK]

➢ Adjust the output level of signal generator 2 until the level reading of marker 1 is -10 dBm ± 0.1 dB.

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

➢ set center frequency to intermodulation product (2 x f_{g1} - f_{g2})
[**FREQUENCY CENTER** : {f_{in} - 100 kHz}]

- [**MARKER SEARCH** : PEAK]

  The level difference Δ between generator signal and third order intermodulation product is displayed by the reading ´Delta 1 [T1 FXD]´.
  The intermodulation ratio $a_{IM3,1}$ can be calculated as follows:
  IMR1 = - ´Delta 1 [T1 FXD]´

➢ set center frequency to intermodulation product (2 x f_{g2} - f_{g1})
[**FREQUENCY CENTER** : {f_{in} + 200 kHz}]

- [**MARKER SEARCH** : PEAK]

  The level difference Δ between generator signal and third order intermodulation product is displayed by the reading ´Delta 1 [T1 FXD]´.
  The intermodulation ratio IMR2 can be calculated as follows:
  IMR3 = - ´Delta 1 [T1 FXD]´

Evaluation:

The third order intercept point (T.O.I) referred to the input signal can be calculated as

$$T.O.I. = \frac{IMR}{2} - 10dBm \ ,$$

where IMR is the lower of IMR_1 and IMR_2

See table 1-2 (item 7) of performance test report for limits of T.O.I.

Second-Order Harmonic Distortion

Test equipment:

- signal generator (table 1-1, item 3)
  frequency range
  FSIQ3: 9 kHz to 1.7 GHz
  FSIQ7 / FSIQ26 / FSIQ40: 9kHz to 3.4 GHz

  To improve the harmonic suppression of the generator it is recommended to insert a lowpass filter with a suitable cut-off frequency (table 1-1, item 14) after the generator.

  The required suppression of the second harmonics is listed in the table at the end of this section. As a result, the error for the entire frequency range is < 1dB.

Test setup:

- ➢ connect RF output of the signal generator to the input of the lowpass
- ➢ connect the output of the lowpass to the RF input of the FSIQ

Note: *If the harmonic suppression of the signal generator is sufficient, the lowpass can be left out.*
The RF output of the generator can be connected directly to the RF input of the FSIQ in this case.

Signal generator settings:

- frequency: f_{in}

see table 1-2 (item 8) of performance test report for values of f_{in}

- level: -10 dBm

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **0 dB**]
- [**LEVEL REF** : **-10 dBm**]
- [**FREQUENCY SPAN** : **3 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **1 kHz**]
- [**FREQUENCY CENTER** : {f_{in}}]

See table 1-2 (item 8) of performance test report for values of f_{in}

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

➢ set center frequency of the FSIQ to the frequency of the 2nd harmonic
[**FREQUENCY CENTER** : {2 x f_{in}}]

See table 1-2 (item 8) of performance test report for values of f_{in}

➢ set marker to peak of the 2nd harmonic
[**MARKER SEARCH** : PEAK]

Evaluation:

The reading ´Delta 1 [T1 FXD]´ displays the level difference Δ between the generator signal and the second harmonic. The second harmonic suppression (a_{k2}) can be calculated as follows: $a_{k2} = -\Delta$

The exact input level L_{in} is displayed by the reading ´FXD {level} dBm´.

The second-order distortion factor can be calculated as follows:

$$IP_{k2} / dBm = a_{k2} + L_{in}$$

See table 1-2 (item 8) of performance test report for nominal values.

Frequency range	IP_{k2}	**Required suppression of the second harmonics**
f ≤ 150 MHz	> 25 dBm	45 dBc
f > 150 MHz	> 40 dBm	60 dBc

Checking IF Filters

Test equipment: signal generator (table 1-1, item 3):
frequency 120 MHz
level ≥ -10 dBm

Test setup: ➢ connect RF output of the signal generator to the RF input of the FSIQ.

Checking the Level Error

Note for instrument models 03/07/26: *See chapter "Test Instructions for Instrument Models 03/07/26 with Option FSE-B22" when option FSE-B22 is installed.*

Reference Measurement (RBW 5 kHz)

Signal generator settings:
- frequency: 120 MHz
- level: -20 dBm

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**SWEEP COUPLING** : COUPLING RATIO : RBW/VBW SINE [1]]
- [**SWEEP COUPLING** : COUPLING RATIO : SPAN/RBW MANUAL : **5** : **ENTER**]
- resolution bandwidth 5 kHz
  [**FREQUENCY SPAN** : **25 kHz**]
- ➢ set marker to peak of signal
  [**MARKER SEARCH** : PEAK]
- ➢ set reference to peak of signal
  [**MARKER DELTA** : REFERENCE FIXED]

Checking the Level Error

FSIQ settings:
- [**FREQUENCY SPAN** : {5 x RBW}]

  See table 1-2 (item 9) of performance test report for values of RBW.
- [**SWEEP COUPLING** : RES BW MANUAL : {RBW}][1]

[1] ***Note:*** *To check the level error of the 5-MHz and the 10-MHz filter, the resolution bandwidth has to be set manually to 5 MHz or 10 MHz. All other bandwidths will be set automatically by changing the frequency span.*

- ➢ set marker to peak of signal
  [**MARKER SEARCH** : PEAK]

The level error is displayed by the reading
´Delta 1 [T1 FXD] {level error} dB´.

Evaluation: See table 1-2 (item 9) of performance test report for upper and lower limits of level error.

Checking 3-dB Bandwidths

Signal generator settings:
- frequency: 120 MHz
- level: -20 dBm

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**SWEEP COUPLING** : COUPLING RATIO : RBW/VBW SINE [1]]
- [**SWEEP COUPLING** : COUPLING RATIO : SPAN/RBW MANUAL : **5** : **ENTER**]

➢ determine 3-dB bandwidth
[**MARKER SEARCH** : **MENU** ⇒ : N DB DOWN : **3 dB**]

- [**FREQUENCY SPAN** : {5 x RBW}]
See table 1-2 (item 10) of performance test report for values of RBW.

- [**SWEEP COUPLING** : RES BW MANUAL : {RBW}][1]

[1] ***Note:*** *To check the bandwidth of the 5-MHz and the 10-MHz filter, the resolution bandwidth has to be set manually to 5 MHz or 10 MHz. All other bandwidths will be set automatically by changing the frequency span.*

- [**MARKER SEARCH** : PEAK]

The 3-dB bandwidth is displayed by the reading ´BW {bandwidth}´.

Evaluation:

See table 1-2 (item 10) of performance test report for upper and lower limits of 3dB-bandwidths.

Checking the Shape Factor

Signal generator settings:
- frequency: 120 MHz
- level: –10 dBm

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**SWEEP COUPLING** : COUPLING RATIO : SPAN/RBW MANUAL : **30** : **ENTER**]

➢ determine shape factor
[**MARKER SEARCH** : **MENU** ⇒ : SHAPE FACT 60/3 DB]

- [**FREQUENCY SPAN** : {30 x RBW}]

See table 1-2 (item 11) of performance test report for values of RBW.

- [**SWEEP COUPLING** : RES BW MANUAL : {RBW}][1]

[1] ***Note:*** *To check the shape factor of the 5-MHz and the 10-MHz filter the resolution bandwidth has to be set manually to 5 MHz or 10 MHz. All other bandwidths will be set automatically by changing the frequency span.*

- [**MARKER SEARCH** : PEAK]

The shape factor is displayed by the reading ´SH3 {shape factor}´.

Evaluation:

See table 1-2 (item 11) of performance test report for upper and lower limits of shape factor.

Checking LO Feedthrough, Noise Display

Test equipment: 50-Ω termination (table 1-1, item 6)
frequency range FSIQ3 up to 3.5 GHz
FSIQ7 up to 7 GHz
FSIQ26 up to 26.5 GHz
FSIQ40 up to 40 GHz
return loss > 20 dB

Test setup: ➢ terminate the RF input of the FSIQ with 50 Ω

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **0 dB**]
- [**FREQUENCY SPAN** : **0 Hz**]

LO Feedthrough

Additional FSIQ settings:
- [**LEVEL REF** : **-10 dBm**]
- [**FREQUENCY CENTER** : **0 Hz**]

➢ start calibration of LO compensation
[**SYSTEM CAL** : CAL LO SUP]

➢ set marker to peak
[**MARKER SEARCH** : PEAK]

Evaluation: The LO feedthrough is displayed by the level reading of marker 1.

Noise Display

Additional FSIQ settings:
- [**SWEEP COUPLING** : RES BW MANUAL : **10 Hz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **1 Hz**]
- [**SWEEP COUPLING** : SWEEP TIME MANUAL : **0.1 s**]
- [**TRACE 1** : AVERAGE]
- [**TRACE 1** : SWEEP COUNT : **30 ENTER**]
- [**LEVEL REF** : {L_{ref}}]
- [**FREQUENCY CENTER** : {f_n}]

Values of L_{ref}:
20 Hz:-30 dBm; 1 kHz:-30 dBm; 9.9 kHz:-60 dBm; ≥95 kHz:-60 dBm
See table 1-2 (item 13) of performance test report for values of f_n.

➢ set marker to peak
[**MARKER SEARCH** : PEAK]

Evaluation: The noise level is displayed by the level reading of marker 1.

Checking the Frequency Response

Test equipment:

- signal generator FSIQ3: table 1-1, item 2;
  FSIQ7/26/40: table 1-1, item 2 and item 3
  - frequency range FSIQ3: 1 MHz to 3.5 GHz
    FSIQ7: 1 MHz to 7 GHz
    FSIQ26: 1 MHz to 26.5 GHz
    FSIQ40: 1 MHz to 40 GHz
  - maximum level ≥ -10 dBm
- power meter (table 1-1, item 7)
- power sensor FSIQ3: table 1-1, item 8;
  FSIQ7/26/40: table 1-1, item 8 and 9.
  - frequency range FSIQ3: 1 MHz to 3.5 GHz
    FSIQ7: 1 MHz to 7 GHz
    FSIQ26: 1 MHz to 26.5 GHz
    FSIQ40: 1 MHz to 40 GHz
  - maximum power $P_{max} \geq 100\ \mu W$
  - RSS referred to indicated power
    1 MHz to 1 GHz .....≤ 1.5 %
    1 GHz to 7 GHz.....≤ 2 %
    7 GHz to 26.5 GHz.....≤ 3.5 %
    26.5 GHz to 40 GHz.....≤ 4 %
  - impedance Z = 50 Ω
- 6-dB divider (table 1-1, item 5)
  - frequency range FSIQ3: 1 MHz to 3.5 GHz
    FSIQ7: 1 MHz to 7 GHz
    FSIQ26: 1 MHz to 26.5 GHz
    FSIQ40: 1 MHz to 40 GHz
  - level imbalance[1]
    1 MHz to 1 GHz ≤ 0.15 dB
    1 GHz to 7 GHz ≤ 0.2 dB
    7 GHz to 18 GHz ≤ 0.3 dB
    18 GHz to 26.5 GHz ≤ 0.4 dB
    26.4 GHz to 40 GHz ≤ 0.4 dB

[1] If a power splitter with higher level imbalance is used correction of the measured frequency response is recommended.

Determining the absolute error at 120 MHz

Test setup:

- ➢ connect power sensor to the power meter and execute function ´ZERO´ when there is no signal applied to the power sensor
- ➢ connect power sensor to RF output of signal generator

Signal generator settings:

- frequency 120 MHz
- level -10 dBm

Measurement:

- ➢ determine output power of the signal generator with the power meter
- ➢ connect RF output of the signal generator to RF input of the FSIQ

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **-7 dBm**]
- [**FREQUENCY SPAN** : **15 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**FREQUENCY CENTER** : **120 MHz**]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The deviation between the signal levels measured with the power meter and the FSIQ (level reading of marker 1) reflects the absolute level error of the FSIQ. It can be calculated as

$$\text{absolute error}_{120\text{MHz}} = L_{FSIQ} - L_{powermeter}$$

Checking the frequency response

Test setup:

➢ connect RF output of the signal generator to input of the divider
➢ connect output 1 of the divider to the power sensor of the power meter
➢ connect output 2 of the divider to RF input of the FSIQ

Signal generator settings:

- level -10 dBm
- frequency f_{fresp}

see table 1-2 (item 14) of performance test report for values of f_{fresp}

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : {a_{ATT}}]
- [**LEVEL REF** : **-7 dBm**]
- [**FREQUENCY SPAN** : **30 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**FREQUENCY CENTER** : {f_{fresp}}]

see table 1-2 (item 14) of performance test report for values of f_{fresp} and a_{ATT}.

➢ activate ´preselector peak´ if center frequency is higher than 7 GHz (only available for FSIQ26)
[**SYSTEM CAL** : PRESEL PEAK]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

The signal level L_{FSIQ} is displayed by the level reading of marker 1.

Power meter settings:

Determine signal level $L_{powermeter}$. To achieve higher accuracy it is recommended to compensate the frequency response of the power sensor.

Evaluation:

The frequency response can be calculated as

$$\text{Frequency response} = L_{FSIQ} - L_{powermeter} - \text{absolute error}_{120\text{ MHz}}$$

Note for instrument models 03/07/26: *See chapter "Test Instructions for Instrument Models 03/07/26 with Option FSE-B22" when option FSE-B22 is installed.*

Checking the Display Linearity

Note for instrument models 03/07/26: *See chapter "Test Instructions for Instrument Models 03/07/26 with Option FSE-B22" when option FSE-B22 is installed.*

Test equipment:

- signal generator (table 1-1, item 3)
  frequency 5 MHz
  maximum level ≥ 6 dBm
- step attenuator (table 1-1, item 12)
  frequency 5 MHz
  attenuation 0 to 95 dB
  steps 1 dB
  maximum attenuation error < 0.05 dB

Test setup:

- ➢ connect RF output of the signal generator to RF input of the step attenuator
- ➢ connect RF output of the step attenuator to RF input of the FSIQ

Signal generator settings:

- frequency 5 MHz
- level +6 dBm

Step attenuator settings:

attenuation 16 dB

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **500 Hz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **3 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**LEVEL RANGE** : LOG 100 dB]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

Measurement

Step attenuator settings:

attenuation $\{a_{ATT}\}$

see table 1-2 (item 15) of performance test report for values of a_{ATT}.

Evaluation:

The difference between the level of the input signal of the FSIQ and the reference (about 10 dB below the reference level) is displayed by the reading ´Delta 1 [T1 FXD]´. Compare the measured values with the limits given in table 1-2 (item 15) of performance test report.

Checking the Attenuator

Note for instrument models 03/07/26: *See chapter "Test Instructions for Instrument Models 03/07/26 with Option FSE-B22" when option FSE-B22 is installed.*

Test equipment:

- signal generator (table 1-1, item 3)
  frequency 5 MHz
  maximum level ≥ 6 dBm

- step attenuator (table 1-1, item 12)
  frequency 5 MHz
  attenuation 0 to 70 dB
  steps 10 dB
  maximum attenuation error < 0.05 dB

Test setup:

➢ connect RF output of the signal generator to RF input of the step attenuator
➢ connect RF output of the step attenuator to RF input of the FSIQ

Signal generator settings:

- frequency 5 MHz
- level 0 dBm

Step attenuator settings:

attenuation 60 dB

FSIQ settings:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **500 Hz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **3 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **-30 dBm**]
- [**MARKER SEARCH** : PEAK]

➢ adjust output level of the signal generator until the level reading of marker 1 is exactly -60.0 dBm.

Measurement

Step attenuator settings:

attenuation $\{a_{ATT}\}$

see table below for values of a_{ATT}.

FSIQ settings:

- [**INPUT** : RF ATTEN MANUAL : $\{a_{FSIQ}\}$]
- [**LEVEL REF** : {reference level} **dBm**]
- [**MARKER SEARCH** : PEAK]

see table below for values of a_{FSIQ} and reference level.

Evaluation:

Compare level reading of marker 1 with the limits given in table 1-2 (item 16) of performance test report.

a_{ATT}	70 dB	60 dB	50 dB	40 dB	30 dB	20 dB	10 dB	0 dB
a_{FSIQ}	0 dB	10 dB	20 dB	30 dB	40 dB	50 dB	60 dB	70 dB
reference level	-40 dBm	-30 dBm	-20 dBm	-10 dBm	0 dBm	+10 dBm	+20 dBm	+30 dBm

Checking the IF Gain Switching

Test principle:

The IF gain of the FSIQ can be switched from 0 to 50 dB by changing the reference level at fixed RF attenuation. To prevent the IF gain errors to be mixed up with the log amplifier error it is determined by comparison using an external precision attenuator.

Test equipment:

- signal generator (table 1-1, item 3)
  - frequency 5 MHz
  - maximum level ≥ -10 dBm
- step attenuator (table 1-1, item 10)
  - frequency 5 MHz
  - attenuation 0 to 50 dB
  - steps 1 dB
  - maximum attenuation error < 0.05 dB

Test setup:

➢ connect RF output of the signal generator to RF input of the step attenuator

➢ connect RF output of the step attenuator to RF input of the FSIQ

Signal generator settings:

- frequency 5 MHz
- level -10 dBm

Step attenuator settings:

attenuation 30 dB

FSIQ settings:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **2 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **1 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **-30 dBm**]
- [**MARKER SEARCH** : PEAK]

➢ adjust output level of the signal generator until the level reading of marker 1 is exactly -40.0 dBm.

Measurement

Step attenuator settings:

attenuation {a_{ATT}}

see table below for values of a_{ATT}.

FSIQ settings:

- [**LEVEL REF** : {reference level} **dBm**]

see table below for values of reference level.

- [**MARKER SEARCH** : PEAK]

Evaluation:

Compare level reading of marker 1 with the limits given in table 1-2 (item 17) of performance test report.

10-dB gain steps:

a_{ATT}	Reference level	Marker level Instrument models 13/17/27/40	Marker level Instrument models 03/07/26
0 dB	0 dBm	-10 ±0.2 dBm	-10 ±0,2 dBm
10 dB	-10 dBm	-20 ±0.1 dBm	-20 ±0,2 dBm
20 dB	-20 dBm	-30 ±0.1 dBm	-30 ±0,2 dBm
30 dB	-30 dBm	-40 ±0.1 dBm	-40 ±0,2 dBm
40 dB	-40 dBm	-50 ±0. dBm	-50 ±0,2 dBm
50 dB	-50 dBm	-60 ±0.2 dBm	-60 ±0,2 dBm

1-dB gain steps:

a_{ATT}	Reference level	Marker level
30 dB	-30 dBm	-40,0 ±0.2 dBm
31 dB	-31 dBm	-41 ±0.2 dBm
32 dB	-32 dBm	-42 ±0.2 dBm
33 dB	-33 dBm	-43 ±0.2 dBm
34 dB	-34 dBm	-44 ±0.2 dBm
35 dB	-35 dBm	-45 ±0.2 dBm
36 dB	-36 dBm	-46 ±0.2 dBm
37 dB	-37 dBm	-47 ±0.2 dBm
38 dB	-38 dBm	-48 ±0.2 dBm
39 dB	-39 dBm	-49 ±0.2 dBm

Checking the Phase Noise

Test equipment:

signal generator (table 1-1, item 3)

frequency	498 MHz
level	≥ 0 dBm
phase noise at 498 MHz:	< -100 dBc/Hz @ 100 Hz
	< -115 dBc/Hz @ 1 kHz
	< -127 dBc/Hz @ 10 kHz
	< -130 dBc/Hz @ 100 kHz
	< -142 dBc/Hz @ 1MHz

Test setup:

- ➢ connect RF output of the signal generator to RF input of the FSIQ
- ➢ connect signal generator EXT REF input to the EXT REF output of the FSIQ and set the generator to external reference

Signal generator settings:

- frequency 498 MHz
- level 0 dBm

FSIQ settings:

- [**SYSTEM PRESET**]
- [**CONFIGURATION SETUP** : REFERENCE INT / EXT]
  toggle to internal reference (INT)
- [**FREQUENCY CENTER** : **498 MHz**]
- [**REF LEVEL** : **0 dBm**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**FREQUENCY SPAN** : {span}]

  depending on offset, see table below for values of span.
- [**SWEEP COUPLING** : COUPLING RATIO : RBW/VBW NOISE]
- [**SWEEP COUPLING** : RES BW MANUAL : {RBW}]

  depending on offset, see table below for values of RBW.
- [**TRACE 1** : AVERAGE]
- [**SWEEP** : SWEEP COUNT : **20** : **ENTER**]
- [**MARKER NORMAL**]

➢ set marker to peak of signal
[**MARKER SEARCH**: PEAK]

➢ activate phase noise marker
[**MARKER DELTA**: PHASE NOISE]

- [**FREQUENCY CENTER** : {498 MHz + offset}]

  see table below for values of offset.
- [**REF LEVEL** : {reference level}]

  depending on offset, see table below for values of reference level.
- [**INPUT** : RF ATTEN MANUAL : {a_{FSIQ}}]

  depending on offset, see table below for values of a_{FSIQ} .

➢ set phase noise marker
[**MARKER DELTA** : {offset}]

see table below for values of offset.

***Note**: Please make sure not to measure on a spurious signal.*

Evaluation: The phase noise is display by the reading ´Delta 1 [T1 NOI]´. Compare the measured values with the limits given in table 1-2 (item 18) of performance test report

Phase noise measurement settings				
Offset	**Span**	**RES BW**	**Reference Level**	**a_{FSIQ}**
100 Hz	20 Hz	10 Hz	0 dBm	10 dB
1 kHz	200 Hz	100 Hz	0 dBm	10 dB
10 kHz	2 kHz	500 Hz	-10 dBm	10 dB
100 kHz	10 kHz	3 kHz	-20 dBm	0 dB
1 MHz	100 kHz	30 kHz	-20 dBm	0 dB

Notes: *To obtain a precise measurement of the phase noise at high offsets the level used at the FSIQ input is 20 dB higher than the reference level. To reduce the measurement time the phase noise is measured with a small span around the frequency offset. This prevents the FSIQ from being overloaded.*

Checking the Tracking Generator – Option FS-B8/B9/B10/B11

Checking the Output Level

Test equipment: N-connecting cable (Table 1-1, item 15)

Test setup: ➢ Connect output of tracking generator to RF-input of FSIQ.

FSIQ settings:
- [**MODE TRACKING**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**FREQUENCY SPAN** : **0 MHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **20 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **20 kHz**]
- [**LEVEL RANGE** : LOG 50 dB]
- [**MODE TRACKING** : SOURCE ON]
- [**MODE TRACKING** : SOURCE POWER {level}]

Values for {level} : 0 dBm; -3 dBm; -6 dBm; -10 dBm; -20 dBm

Evaluation: Compare measured values with values from Table 1-2, item no. 19.

Checking the Frequency Response

Test equipment: N-connecting cable (Table 1-1, item 15)

Test setup: ➢ Connect output of tracking generator to RF-input of FSIQ.

FSIQ settings:
- [**MODE TRACKING**]
- [**FREQUENCY START** : **1 MHz**]
- [**FREQUENCY STOP** : **3.5(7) MHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **20 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **20 kHz**]
- [**SWEEP COUPLING** : SWEEP TIME MANUAL : **100 ms**]
- [**LEVEL RANGE** : LOG 50 dB]
- [**MODE TRACKING** : SOURCE ON]
- [**MODE TRACKING** : SOURCE POWER 0 dBm]

Evaluation: Compare measured values with limits from Table 1-2, item no. 20.

Checking the I/Q Modulator

Test equipment:
- 2 DC power sources (Table 1-1, item 16)
- 2 DC-voltmeters (Table 1-1, item 17)

Test setup:

➢ Connect DC power sources to the I and Q input of the analyzer.

➢ Use DC-voltmeter to measure voltage at the I and Q inputs.

Power source settings

➢ Set voltage to 250 mV ± 3 mV.

FSIQ settings:
- [**MODE TRACKING**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**FREQUENCY SPAN** : **0 MHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **20 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **20 kHz**]
- [**REF** : REF LEVEL : **0 dBm**]
- [**MODE TRACKING** : SOURCE POWER 0 dBm]
- [**MARKER NORMAL**]

Rated value:..... -6 dBm ± 0.5 dB

This value serves as a reference for the following measurements.

Measurements

Measurement of the residual carrier
- [**LEVEL RANGE** : 100 dB]

➢ Short-circuit I and Q voltages (do not remove!)
The voltmeter must indicate a value < 0.1 mV.

Rated value:..... < -50 dBm

Imbalance measurement (imbalance between the I and Q paths)
- [**LEVEL RANGE** : 10 dBm]

➢ Apply ±250 mV at the Q input, short-circuit at the I input.

Rated value:..... (reference value – 3 dB) ±0.5 dB.

➢ Apply ±250 mV at the I input, short-circuit at the Q input.

Rated value:..... (reference value - 3dB) ±0.5 dB.

Measurement of the quadrature offset

➢ Apply +250 mV at the I input, -250 mV at the Q input.

Rated value:..... reference value ±0.5 dB.

➢ Apply +250 mV at the Q input, -250 mV at the I input.

Rated value:..... reference value ± 0.5 dB.

External Mixer Output - Option FSE-B21

Checking the LO Level

Test equipment:

- power sensor (table 1-1, item 9)
  frequency range 7.5 MHz to 15.2 GHz
  maximum power $P_{max} \geq 40$ mW
  RSS ≤ 2.5% referred to indicated power
  impedance $Z = 50\ \Omega$
- power meter (table 1-1, item 7)
- attenuator with 10 dB fixed attenuation (table 1-1, item 13)

Power meter settings:

➢ Connect power sensor to power meter and carry out function ´ZERO´ when no signal is applied to the power sensor.

FSIQ settings:

- [**SYSTEM PRESET**]
- [**MENU** ⇑ : ANALYZER]

➢ Activate external mixer measurement and toggle to BAND LOCK OFF

- [**INPUT** : MIXER EXTERNAL : BAND LOCK ON / OFF]
- [**INPUT** : MIXER EXTERNAL : HARMONIC# : **20** : **ENTER**]
- [**INPUT** : MIXER EXTERNAL : BIAS : BIAS OFF]
- [**FREQUENCY SPAN** : ZERO SPAN]
- [**FREQUENCY CENTER** : {f_{Center}}]

see table 5.2.1 (item 22) of performance test report for values of f_{Center}

Test setup:

➢ Connect power sensor via 10 dB-attenuator to port 'LO OUT / IF IN' of the FSIQ.

Measurement:

➢ Determine level of the LO-signal $L_{LO,meas}$ with the power meter. Due to the harmonic number (n = 20) the center frequency f_{Center} is twenty times higher than the frequency of the LO-signal. See table 5.2-1 (item 22) of the performance test report for values of f_{Center} . To achieve higher accuracy it is recommended to compensate the frequency response of the power sensor.

The LO-level L_{LO} can be calculated as

$$L_{LO} = L_{LO,meas} + 10\ dB$$

See table 1-2 (item 22) of performance test report for nominal level.

1 dB Attenuator - Option FSE-B13

Test equipment:

- Signal generator (chapter 5, table 1-1, item 3)
  - Frequency 5 MHz
  - Maximum level ≥6 dBm
- External attenuator (chapter 5, table 1-1, item 13)
  - Frequency 5 MHz
  - Attenuation 0 to 70 dB
  - Steps 1 dB
  - Maximum attenuation error < 0.05 dB

Test setup:

➢ Connect the RF output of the signal generator to the RF input of the external attenuator

➢ Connect the RF output of the external attenuator to the RF input of the instrument

Settings on signal generator:

- Frequency 5 MHz
- Level 0 dBm

Settings on the external attenuator:

Attenuation 60 dB

Settings on the instrument:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **500 Hz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **3 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**INPUT** : ATTEN STEPSIZE : **1 dB**]
- [**LEVEL REF** : **-30 dBm**]
- [**MARKER SEARCH** : PEAK]

➢ Adjust the output level of the signal generator until the marker level is exactly at –60.0 dBm.

Measurement

Settings on the external attenuator:

Attenuation $\{a_{ATT}\}$

See table below for values of a_{ATT}.

Settings on FSE:

- [**INPUT** : RF ATTEN MANUAL : $\{a_{FSE}\}$]
- [**LEVEL REF** : {reference level} **dBm**]
- [**MARKER SEARCH** : PEAK]

See table below for values of a_{FSE} and reference level.

Evaluation:

Compare level of marker 1 with the limits of the performance test protocol.

a_{ATT}	20 dB	19 dB	18 dB	17 dB	16 dB	15 dB	14 dB	13 dB	12 dB	11 dB
a_{FSE}	50 dB	51 dB	52 dB	53 dB	54 dB	55 dB	56 dB	57 dB	58 dB	59 dB
Reference level	+10 dBm	+11 dBm	+12 dBm	+13 dBm	+14 dBm	+15 dBm	+16 dBm	+17 dBm	+18 dBm	+19 dBm

Digital Demodulation

Absolute Accuracy at 120 MHz

Test equipment: Power sensor (table 1-1, item 7)

Test setup:

- ➢ Connect power sensor to power meter and perform the ZERO function in the absence of a signal at the sensor.
- ➢ Connect sensor to the RF output of the signal generator.
  Generator settings:
  - Level -10dBm
  - Frequency 120 MHz
- ➢ Determine output power of signal generator with power meter.
- ➢ Connect signal generator to RF input of FSIQ.

FSIQ settings:

- [**LEVEL REF:** -7 DBM]
- [**FREQUENCY CENTER:** 120 MHZ]
- [**MODE**: VECTOR ANALYZER: DIGITAL STANDARDS:GSM]
- [MEAS RESULT: MAG CAP BUFFER]
- [**TRIGGER**: FIND BURST: OFF]
- **[MARKER SEARCH**: SUMMARY MRK ON, SUMMARY MARKER ⇓: MEAN, AVG/HOLD ON, SWEEP COUNT: 10]
- [**SWEEP**:SINGLE SWEEP]

Measurement: The difference between the level displays of power meter and FSIQ is the absolute error at 120 MHz.
Check absolute error $_{120\ MHz} = L_{FSIQ} - L_{power\ meter}$ according to the performance test protocol

Display Linearity

Test equipment:

- Signal generator (Table 1-1, ite*M 3)*
- RF Step Attenuator RSG (Table 1-1, item 12)

Test setup:

- ➢ Connect signal generator via the attenuator to the RF input of FSIQ.
  - Frequency 5 MHz
  - Level +6 DBM
  - Setting of attenuator 16 DB.

Settings FSIQ:

- [**LEVEL RE**F: -7 DBM]
- [FREQUENCY CENTER: 5 MHZ]
- [MODE: VECTOR ANALYZER: DIGITAL STANDARDS:GSM]
- [MEAS RESULT: MAG CAP BUFFER]
- [**TRIGGER**: FIND BURST: OFF]
- **[MARKER SEARCH**: SUMMARY MRK ON, SUMMARY MARKER⇓: MEAN, AVG/HOLD ON, SWEEP COUNT: 10]
- **[SWEEP**:SINGLE SWEEP]

Measurement: Reference level = level measured with FSIQ (SUMMARY MARKER:MEAN) with 16 dB attenuation of step attenuator.

- ➢ Increase attenuation of step attenuator by 10, 30 and 50 dB in compliance with the performance test report; to trigger a measurement on FSIQ enter [SWEEP: SINGLE SWEEP].
- ➢ Check the difference between the displayed level [SUMMARY MARKER MEAN] and the [reference level reduced by attenuation set on step attenuator] and compare to performance test report.

Checking the Dynamic Range for Burst Measurements

Test equipment: Signal generator (Table 1-1, item 3)

Test setup:

- ➢ Connect signal generator to RF input of FSIQ
  - frequency: 1GHz
  - level: -10 dBm

FSIQ settings:

- [**LEVEL REF: -10 dBm]**
- **[ATTEN AUTO LOW NOISE]**
- **[FREQUENCY CENTER: 1 GHz]**
- **[MODE: VECTOR ANALYZER]**

- ➢ Set modulation standard according to performance test report:
  - [DIGITAL STANDARDS:.....]
  - [MEAS RESULT: MAG CAP BUFFER]
  - ⇑:[**RANGE:** REF VALUE Y AXIS:-5 dBm]
  - **[MARKER SEARCH**: SUMMARY MARKER⇓: MEAN, AVG/HOLD: ON, SWEEP COUNT: 10]
  - [**TRIGGER:** FIND BURST OFF]
  - [**SWEEP**: SINGLE SWEEP]

- ➢ Increase signal generator level (separately for each standard) in 1 dB steps until IFOVLD is displayed, then reduce again by 1 dB (press the *SINGLE SWEEP* softkey after each level step).
- ➢ Note down the displayed summary marker MEAN value.
- ➢ Determine dynamic range MAG CAP BUFFER according to table:
  - Set signal generator level to minimum (-139 dBm) and determine the summary marker MEAN value averaged over 10 sweeps *[**SWEEP**: SINGLE SWEEP]*.
  - The difference between the summary marker values at -1 dB below the displayed OVLD and at a transmitter level -140 dBm is the available dynamic range. Check the value for compliance with the performance test report for standard GSM and NADC FWD CH (after changing the standard the vector analyzer must be set again).

Checking the Residual Error (no FSK signals)

Test equipment:

- Signal generator (Table 1-1, item 3)
- ADS (Table 1-1, item 19)
- IQSIM Software (Table 1-1, item 20)

Test setup:

➢ Connect signal generator to RF input of FSIQ.

➢ Synchronize FSIQ and ADS externally with SMHU

- ADS settings: ***SPECIAL FUNCTION**: NEXT: NEXT: NEXT: REF: EXT: 10 MHz.*
- connect ADS output 1 to I-input, output 2 to Q-input of SMHU using a 3dB attenuator and cables of exactly the same length.

➢ Modulate signal generator with ADS I/Q

➢ SMHU settings: frequency 1 GHz; level -7 dBm; IQ modulated.

FSIQ settings:

- [**SETTINGS**: REFERENCE: EXT]
- [**FREQUENCY CENTER**: 1 GHz, SPAN: 400 kHz]
- **LEVEL REF**: -10 dBm:ATTEN AUTO LOW NOISE]
- **COUPLING**: RES BW MANUAL 5 kHz]

Calibration of signal generator:

➢ Calibrate the I/Q modulator of SMHU (shift special 320) and adjust offset on ADS (special function/NEXT/NEXT/DIAG/CAL 0).

➢ Set on ADS: output frequency 100 kHz, 1 V, sinewave signal on both ADS channels, phase -90° for channel 1 and filter OFF for both channels. Adjust carrier suppression (1 GHz) to > 63 dB by gradually varying the CAL D/A converter of both channels and note down set values.
(To do so press the keys SPECIAL FUNCTION: NEXT: NEXT:DIAGN:D/A:CAL and adjust the D/A converter values for both channels using the spinwheel).

➢ Eliminate the difference between the I and Q channels by entering special function 301 on SMHU and varying I>Q (FM key), and the QUAD offset (φM key) by adjusting the 2nd sideband (carrier frequency - 100 kHz) to > 63 dB using the spinwheel.

➢ Repeat the previously noted settings of the two CAL D/A converters for channel 1 and 2 after selecting a DIGITAL STANDARD on ADS.

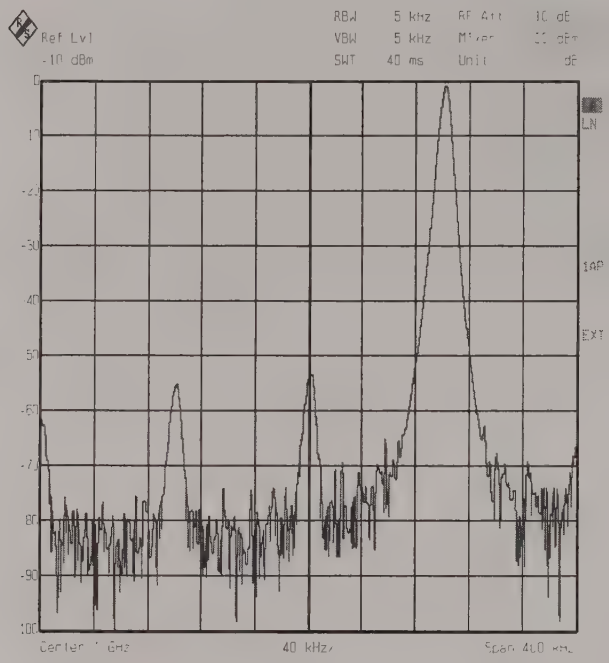


Fig 1-1: Typical SMHU output spectrum before calibration adjustment

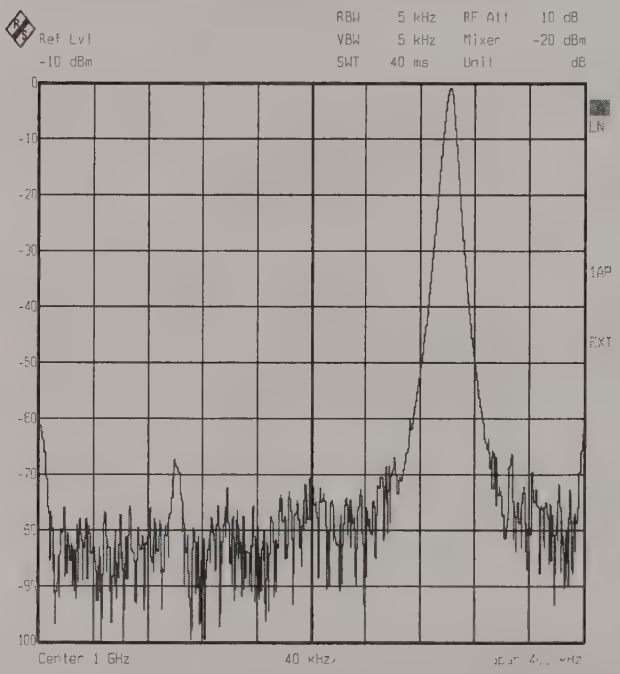


Fig 1-2: Typical spectrum of SMHU after calibration adjustment

Checking the residual error (no FSK signals) with ADS

FSIQ settings:

Same as before but:
- **[LEVEL REF**: -4 dBm]
- [**MODE**: VECTOR ANALYZER]

➢ Set frequency of FSIQ and modulation standard according to table:

- [**FREQUENCY CENTER**: ..... MHz]
- [**MODE**: DIGITAL STANDARD: .....]
- [MEAS RESULT: SYMB TABLE/ERRORS],
- [**TRACE**: AVERAGE, SWEEP COUNT: 10, SINGLE SWEEP]

Measurement:

➢ Generate on ADS with I/Q SIM the standard test signals listed in the table below and check the residual error. Set the signal generator frequency to the f_{RF} given in the table.
Trigger the measurement by entering [SWEEP: SINGLE SWEEP].

(After transmitting all the standard test signals to the ADS, reset the calibration values for the CAL D/A converters of channel 1 and 2 obtained in the preceding calibration.)

	ADS test signal
GMSK symbol rate: 270.833 kHz, f_{RF} = 2 GHz *[DIGITAL STANDARD: GSM]*	GSMSTAN.IQS
π/4-DQPSK symbol rate: 24.3 kHz f_{RF} = 1 GHz, *[DIGITAL STANDARD:* *NADC FORWARD CH,* *TRIGGER: FIND SYNC ON]*	NADC_S1.IQS
π/4-DQPSK, f_{RF} = 1GHz symbol rate 18 kHz *[DIGITAL STANDARD: TETRA]*	TETRA2.IQS
π/4-DQPSK symbol rate: 192 kHz, f_{RF} = 2 GHz *[DIGITAL STANDARD: PHS]*	PHS1.IQS
QPSK symbol rate 1.2288 MHz f_{RF} = 1 GHz *[DIGITAL STANDARD: IS95-CDMA FWD CH]*	QCDMA_F1.IQS
OQPSK symbol rate 1.2288 MHz f_{RF} = 1 GHz *[DIGITAL STANDARD: IS95-CDMA REV CH]*	QCDMA_R1.IQS

Checking the residual error (no FSK signals) with AMIQ

Test equipment:
- Arbitrary waveform generator AMIQ (Section 5.1; item 21)
- Software WinIQSIM (Table 1-1; item 22)

Test setup:
➢ Connect AMIQ output I to RF input of FSIQ.

FSIQ settings:
Same as before but:
- **[LEVEL REF**: -4 dBm]
- [**MODE**: VECTOR ANALYZER]

➢ Set frequency of FSIQ and modulation standard according to table:

- [**FREQUENCY CENTER**: ..... MHz]
- **[MODE**: DIGITAL STANDARD: .....]
- [MEAS RESULT: SYMB TABLE/ERRORS
- [RESULT LENGTH:200], [TRACE: AVERAGE, SWEEP COUNT: 10, SINGLE SWEEP]
- [**SWEEP:**TRIGGER:FIND BURST:ON]

Measurement:
➢ Generate on AMIQ with WinIQSIM the standard test signals listed in the table below and check the residual error. Set the signal generator frequency to the f_{RF} given in the table.
Trigger the measurement by entering [SWEEP: SINGLE SWEEP].

	AMIQ test signal
WCMDA symbol rate 4.096 MHz f_{RF} = 12,288 MHz *[DIGITAL STANDARD: WCDMA 4.096 FWD CH]*	WCDMA_F1.WV
QPSK symbol rate 6.4 MHz f_{RF} = 12 MHz *[REFERENCE FILTER: Raised Cos]* *[MEAS FILTER: Root Raised Cos]* *[ALPHA/BT:0,2]*	WPSKSIG6.WV

Checking the Residual Error (FSK signals)

Test equipment:

- Signal generator (Section 5.2, item 3)
- ADS (Section 5.2, item 19)
- Software IQSIM (Section 5.2, item 20)

Test setup:

➢ Connect signal generator to RF input of FSIQ.

➢ Synchronize FSIQ and ADS externally with SMHU

- ADS settings: ***SPECIAL FUNCTION****: NEXT: NEXT: NEXT: REF: EXT: 10 MHz.*
- connect ADS output 1 to I-input, output 2 to Q-input of SMHU using a 3dB attenuator and cables of exactly the same length.

➢ Modulate signal generator with ADS I/Q

➢ SMHU settings: frequency 1 GHz; level -7 dBm; IQ modulated.

➢ Calibrate as described in section 5.3.2.4.

Settings an FSIQ:

[**MODE:** VECTOR ANALYZER]

➢ Set frequency of FSIQ and modulation standard according to table:

- [FREQUENCY CENTER: ..... MHz]
- [MODE: DIGITAL STANDARD: .....]
- [**LEVEL REF**: -10 dB, ATTEN AUTO: LOW NOISE]

➢ Set required modulation standard according to table and also:

- [RESULT DISPLAY: SYMB TABLE/ERRORS, TRACE: AVERAGE, SWEEP: COUNT: 10, SINGLE SWEEP]

Measurement:

➢ Generate on ADS with I/Q SIM the standard test signals listed in the table below and check the residual error. Set the signal generator frequency to the f_{RF} given in the table.
Trigger the measurement by pressing the *SINGLE SWEEP* softkey.

(After transmitting all the standard test signals to the ADS, reset the calibration values for the CAL D/A converters of channel 1 and 2 obtained in the preceding calibration.)

	ADS test signal
4-FSK symbol rate: 3.125 kHz, f_{RF} = 1 GHz *[DIGITAL STANDARD:ERMES]*	ERMES1.IQS
2-FSK symbol rate 72 kHz f_{RF} = 1 GHz *[DIGITAL STANDARD: CT2]*	CT2_1.IQS
2-FSK symbol rate: 1.152 MHz, f_{RF} = 2 GHz *[DIGITAL STANDARD:DECT]*	DECT1.IQS

Analog Demodulation

Test equipment: Signal generator SMHU 58 (Table 1-1, item 3)

Test setup:

➢ Connect signal generator to RF input of FSIQ (frequency 1 GHz, level: -10 dBm)

➢ Connect 10 MHz reference output at the rear to reference input of FSIQ. Set FSIQ to 10 MHz external reference:

[**SETTINGS**: REF FREQ: EXTERN]

FSIQ settings:

– [**FREQUENCY CENTER**: 1 GHz]
– [**LEVEL REF**: -4 dBm]
– [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
– [MEAS RESULT: REAL TIME ON]

REAL TIME OFF

Measurement Error with AM Demodulation

Settings on SMHU: AM internal 50 %, AF according to performance test report.

FSIQ settings:

- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [MEAS RESULT: AM Signal: MODULATION SUMMARY],
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:

➢ Check displayed AM ±Pk/2 of modulation summary for compliance with performance test report.

Spurious AM

Settings on SMHU: AM OFF

FSIQ settings:

- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [MEAS RESULT: AM Signal: MODULATION SUMMARY],
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:

➢ Check displayed AM RMS of modulation summary for compliance with performance test report.

Measurement Error with FM Demodulation

Settings on SMHU: FM INTERN ON,
Set AF and frequency deviation according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [MEAS RESULT: FM Signal: MODULATION SUMMARY],
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed FM ±Pk/2 of modulation summary for compliance with performance test report.

Residual FM

Settings on SMHU: FM INTERN OFF

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [MEAS RESULT: FM Signal: MODULATION SUMMARY],
- [MODULATION PARAMETER: AF LOWPASS 5%[DEMOD BW],
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed FM RMS of modulation summary for compliance with performance test report.

Measurement Error with PM Demodulation

Settings on SMHU: PM internal ON, phase deviation and AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [**MODE**: VECTOR ANALYZER]
- [MEAS RESULT: PM Signal: MODULATION SUMMARY],
- [MODULATION PARAMETER: AF LOWPASS: OFF]

Evaluation:
➢ Check displayed PM ±Pk/2 of modulation summary for compliance with performance test report.

Spurious PM

Settings on SMHU: Frequency: 100 MHz, Modulation Off

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1000 MHz]
- [**MODE**: VECTOR ANALYZER]
- [MODULATION PARAMETER: AF LOWPASS: 5%[DEMOD BW],
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed PM RMS of modulation summary for compliance with performance test report.

Error of Carrier Power Measurement

Settings on SMHU: Frequency: 1 GHz, Modulation Off, level according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**:1 GHz]
- [**MODE**: MEAS RESULT: AM SIGNAL: MODULATION SUMMARY]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation: ➢ Check displayed CARR PWR of modulation summary for compliance with performance test report.

Error of Audio Frequency Measurement

Settings on SMHU: AM INTERN 50%, level -10 dBm, AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: MEAS RESULT: AM SIGNAL: MODULATION SUMMARY]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation: ➢ Check displayed audio frequency of modulation summary for compliance with performance test report.

REAL TIME ON

Measurement Error with AM Demodulation

Settings on SMHU: AM INTERN 50%, level -10 dBm, AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: REAL TIME: ON: AM SIGNAL: MODULATION SUMMARY]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation: ➢ Check displayed AM ±Pk/2 of modulation summary for compliance with performance test report.

Spurious AM

Settings on SMHU: AM INTERN OFF, level -10 dBm, AF according to performance test report.

FSIQ settings: As before

Evaluation: ➢ Check displayed AM RMS of modulation summary for compliance with performance test report.

Measurement Error with FM Demodulation

Settings on SMHU: FM INTERN ON, AF and frequency deviation according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: FM Signal: MODULATION SUMMARY]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed FM ±Pk/2 of modulation summary for compliance with performance test report.

Residual FM

Settings on SMHU: FM INTERN OFF

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MODULATION PARAM: AF LOWPASS: 3 kHz:AF HIGHPASS:300 Hz]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed FM RMS of modulation summary for compliance with performance test report.

Measurement Error with PM Demodulation

Settings on SMHU: PM INTERNI ON, phase deviation and AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: PM Signal: MODULATION SUMMARY]
- [AF LOWPASS: OFF, AF HIGHPASS: 30 Hz).
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed PM ±Pk/2 of modulation summary for compliance with performance test report.

Spurious PM

Settings on SMHU: PM INTERN OFF

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MODULATION PARAM: AF LOWPASS: 3 kHz:AF HIGHPASS:300 Hz]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed PM RMS of modulation summary for compliance with performance test report.

Carrier Power

Settings on SMHU: Modulation Off: level according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: AM SIGNAL: MODULATION SUMMARY]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed CARR PWR of modulation summary for compliance with performance test report.

Audio Frequency Measurement

Settings on SMHU: FM INTERN, deviation and AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: FM SIGNAL: MODULATION SUMMARY]
- [MODULATION PARAMETER: AF HIGHPASS: OFF: AF LOWPASS OFF]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed AUDIO FREQ of modulation summary for compliance with performance test report.

SINAD with AM

Settings on SMHU: AM INTERNAL 50 %, AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: FM SIGNAL: MODULATION SUMMARY]
- [SUMMARY SETTINGS: SINAD: ON]
- MODULATION PARAMETER: AF HIGHPASS: 300Hz, AF LOWPASS:3kHz]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed SINAD of modulation summary for compliance with performance test report.

SINAD with FM

Settings on SMHU: AM INTERN OFF,
FM INTERN, deviation and AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: FM SIGNAL: MODULATION SUMMARY]
- MODULATION PARAMETER: AF HIGHPASS: 300Hz, AF LOWPASS:3kHz]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed SINAD of modulation summary for compliance with performance test report.

SINAD with PM

Settings on SMHU: FM INTERN OFF,
PM INTERN ON, deviation and AF according to performance test report.

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: PM SIGNAL: MODULATION SUMMARY]
- MODULATION PARAMETER: AF HIGHPASS: 300Hz, AF LOWPASS:3kHz]
- set [DEMOD BW] and [IF BW] according to performance test report.

Evaluation:
➢ Check displayed SINAD of modulation summary for compliance with performance test report.

Audio Output Function

Settings on SMHU: AM INTERN 50%, AF = 1 kHz

FSIQ settings:
- [**LEVEL REF**: -4 dBm]
- [**FREQUENCY CENTER**: 1 GHz]
- [**MODE**: VECTOR ANALYZER: ANALOG DEMOD]
- [MEAS RESULT: AM SIGNAL: REAL TIME ON
- [DEMOD BW: 200 kHz: IF BW 1 MHz]
- [SENSITIV AF OUTPUT: 100%: VOLUME:---%] according to performance test report.

Evaluation:
➢ Carry out acoustic test according to performance test report.

Performance Test Report

Note: *The values given in the datasheet are the guaranteed limits. Due to measurement errors these limits must be extended by the tolerance of the measuring equipment used in this performance test.*

Table 1-2 Performance test report

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
1	Calibration source at 120 MHz	1.4				
	Instrument models 03/07/26		-0,3	_____	+0,3	dB
	Instrument models 13/17/27/40		-0,2	_____	+0,2	dB
2	Frequency accuracy Reference oscillator	1.5	9.999999	_____	10.000001	MHz
3	Return loss RF input f_{in}	1.5				
	FSIQ3 / FSIQ7 / FSIQ26 / FSIQ40:					
	10 MHz		14	_____	-	dB
	250 MHz		14	_____	-	dB
	500 MHz		14	_____	-	dB
	750 MHz		14	_____	-	dB
	1000 MHz		14	_____	-	dB
	1250 MHz		14	_____	-	dB
	1500 MHz		14	_____	-	dB
	1750 MHz		14	_____	-	dB
	2000 MHz		14	_____	-	dB
	2250 MHz		14	_____	-	dB
	2500 MHz		14	_____	-	dB
	2750 MHz		14	_____	-	dB
	3000 MHz		14	_____	-	dB
	3250 MHz		14	_____	-	dB
	3500 MHz		14	_____	-	dB
	3250 MHz		14	_____	-	dB
	3500 MHz		14	_____	-	dB
	FSIQ7 / FSIQ26 / FSIQ40:					
	3750 MHz		9.5	_____	-	dB
	4000 MHz		9.5	_____	-	dB
	4250 MHz		9.5	_____	-	dB
	4500 MHz		9.5	_____	-	dB
	4750 MHz		9.5	_____	-	dB
	5000 MHz		9.5	_____	-	dB
	5250 MHz		9.5	_____	-	dB
	5500 MHz		9.5	_____	-	dB
	5750 MHz		9.5	_____	-	dB
	6000 MHz		9.5	_____	-	dB
	6250 MHz		9.5	_____	-	dB
	6500 MHz		9.5	_____	-	dB
	6750 MHz		9.5	_____	-	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
3	Return loss RF input RF ATT: 10 dB	1.5				
	FSIQ26 / FSIQ40:		**FSIQ26/FSIQ40**			
	7000 MHz		6 / 7,4	_____	-	dB
	8000 MHz		6 / 7,4	_____	-	dB
	9000 MHz		6 / 7,4	_____	-	dB
	10 GHz		6 / 7,4	_____	-	dB
	11 GHz		6 / 7,4	_____	-	dB
	12 GHz		6 / 7,4	_____	-	dB
	13 GHz		6 / 7,4	_____	-	dB
	14 GHz		6 / 7,4	_____	-	dB
	15 GHz		6 / 7,4	_____	-	dB
	16 GHz		6 / 7,4	_____	-	dB
	17 GHz		6 / 7,4	_____	-	dB
	18 GHz		6 / 7,4	_____	-	dB
	19 GHz		6 / 7,4	_____	-	dB
	20 GHz		6 / 7,4	_____	-	dB
	21 GHz		6 / 7,4	_____	-	dB
	22 GHz		6 / 7,4	_____	-	dB
	23 GHz		6 / 7,4	_____	-	dB
	24 GHz		6 / 7,4	_____	-	dB
	25 GHz		6 / 7,4	_____	-	dB
	26 GHz		6 / 7,4	_____	-	dB
	26.5 GHz		6 / 7,4	_____	-	dB
	FSIQ40:					
	27 GHz		7,4	_____	-	dB
	28 GHz		7,4	_____	-	dB
	29 GHz		7,4	_____	-	dB
	30 GHz		7,4	_____	-	dB
	31 GHz		7,4	_____	-	dB
	32 GHz		7,4	_____	-	dB
	33 GHz		7,4	_____	-	dB
	34 GHz		7,4	_____	-	dB
	35 GHz		7,4	_____	-	dB
	36 GHz		7,4	_____	-	dB
	37 GHz		7,4	_____	-	dB
	38 GHz		7,4	_____	-	dB
	39 GHz		7,4	_____	-	dB
	39,9 GHz		7,4	_____	-	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
4	1st IF image frequency rejection f_{in}	1.8				
	FSIQ3:					
	11 MHz		80	_____	-	dB
	100 MHz		80	_____	-	dB
	1701 MHz		80	_____	-	dB
	3499 MHz		80	_____	-	dB
	FSIQ7 / FSIQ26 / FSIQ40:					
	11 MHz		80	_____	-	dB
	100 MHz		80	_____	-	dB
	1701 MHz		80	_____	-	dB
	3499 MHz		80	_____	-	dB
	6999 MHz		80	_____	-	dB
5	2nd IF image frequency rejection f_{in}	1.9				
	FSIQ3:					
	999 MHz		80	_____	-	dB
	FSIQ7 / FSIQ26 / FSIQ40					
	999 MHz		80	_____	-	dB
	7999 MHz		80	_____	-	dB
6	1st IF rejection f_{in}	1.9				
	FSIQ3:					
	100 MHz		100	_____	-	dB
	1701 MHz		100	_____	-	dB
	3499 MHz		100	_____	-	dB
	FSIQ7 / FSIQ26 / FSIQ40:					
	100 MHz		70	_____	-	dB
	1701 MHz		70	_____	-	dB
	3500 MHz		70	_____	-	dB
	FSIQ26 / FSIQ40:					
	7001 MHz		70	_____	-	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
7	3rd-order intercept f_{in}	1.11				
	FSIQ3 / FSIQ7 / FSIQ26 / FSIQ40:		**3 / 7, 26, 40**			
	10 MHz		9 / 14	_____	-	dBm
	28 MHz		97 / 14	_____	-	dBm
	106 MHz		12 / 14	_____	-	dBm
	261 MHz		12 / 14	_____	-	dBm
	640 MHz		12 / 14	_____	-	dBm
	1 GHz		12 / 17	_____	-	dBm
	1.7 GHZ		12 / 17	_____	-	dBm
	2.5 GHz		12 / 17	_____	-	dBm
	3.48 GHz		12 / 17	_____	-	dBm
	FSIQ7 / FSIQ26 / FSIQ40:					
	6.98 GHz		12	_____	-	dBm
	FSIQ26 / FSIQ40:					
	7.5 GHz		12	_____	-	dBm
	15 GHz		12	_____	-	dBm
	25 GHz		12	_____	-	dBm
	FSIQ40:					
	30 GHz		10	_____	-	dBm
	35 GHz		10	_____	-	dBm
	39 GHz		10	_____	-	dBm
8	2nd-order harmonic distortion f_{in}	1.12				
	FSIQ3 / FSIQ7 / FSIQ26 / FSIQ40:		**3 / 7 , 26, 40**			
	9 kHz		25 / 25	_____	-	dBm
	35 kHz		25 / 25	_____	-	dBm
	99 kHz		25 / 25	_____	-	dBm
	19 MHz		25 / 25	_____	-	dBm
	28 MHz		25 / 25	_____	-	dBm
	107 MHz		45 / 25	_____	-	dBm
	262 MHz		45 / 40	_____	-	dBm
	453 MHz		45 / 40	_____	-	dBm
	640 MHz		45 / 40	_____	-	dBm
	1 GHz		45 / 40	_____	-	dBm
	1.25 GHz		45 / 40	_____	-	dBm
	1.7 GHz		45 / 40	_____	-	dBm
	FSIQ7 / FSIQ26 / FSIQ40:					
	3.4 GHz		40	_____	-	dBm

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
9	IF bandwidths Level error Instrument models 03/07/26: reference (Ref): 5 kHz	1.13	 -	 _____	 -	 dBm
	100 Hz		-0,2	_____	+0,2	dB
	1 kHz		-0,2	_____	+0,2	dB
	2 kHz		-0,2	_____	+0,2	dB
	3 kHz		-0,2	_____	+0,2	dB
	10 kHz		-0,2	_____	+0,2	dB
	20 kHz		-0,2	_____	+0,2	dB
	30 kHz		-0,2	_____	+0,2	dB
	50 kHz		-1,0	_____	+1,0	dB
	100 kHz		-0,2	_____	+0,2	dB
	200 kHz		-0,2	_____	+0,2	dB
	300 kHz		-0,2	_____	+0,2	dB
	500 kHz		-0,2	_____	+0,2	dB
	1 MHz		-0,3	_____	+0,3	dB
	2 MHz		-0,3	_____	+0,3	dB
	3 MHz		-0,3	_____	+0,3	dB
	5 MHz		-0,3	_____	+0,3	dB
	10 MHz		-0,3	_____	+0,3	dB
9	IF bandwidths Level error Instrument models 13/17/27/40: reference (Ref): 5 kHz	1.13	 -	 _____	 -	 dBm
	100 Hz		-0,15	_____	+0,15	dB
	1 kHz		-0,15	_____	+0,15	dB
	2 kHz		-0,15	_____	+0,15	dB
	3 kHz		-0,15	_____	+0,15	dB
	10 kHz		-0,15	_____	+0,15	dB
	20 kHz		-0,15	_____	+0,15	dB
	30 kHz		-0,15	_____	+0,15	dB
	50 kHz		-1,0	_____	+1,0	dB
	100 kHz		-0,2	_____	+0,2	dB
	200 kHz		-0,2	_____	+0,2	dB
	300 kHz		-0,15	_____	+0,15	dB
	500 kHz		-0,2	_____	+0,2	dB
	1 MHz		-0,3	_____	+0,3	dB
	2 MHz		-0,3	_____	+0,3	dB
	3 MHz		-0,3	_____	+0,3	dB
	5 MHz		-0,3	_____	+0,3	dB
	10 MHz		-0,3	_____	+0,3	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
10	IF bandwidths 3-dB bandwidth	1.14				
	100 Hz		-10 %-	_____	+10 %	-
	1 kHz		-10 %-	_____	+10 %	-
	2 kHz		-10 %-	_____	+10 %	-
	3 kHz		-10 %-	_____	+10 %	-
	5 kHz		-10 %-	_____	+10 %	-
	10 kHz		-10 %-	_____	+10 %	-
	20 kHz		-10 %-	_____	+10 %	-
	30 kHz		-10 %-	_____	+10 %	-
	50 kHz		-10 %-	_____	+10 %	-
	100 kHz		-10 %-	_____	+10 %	-
	200 kHz		-10 %-	_____	+10 %	-
	300 kHz		-10 %-	_____	+10 %	-
	500 kHz		-10 %-	_____	+10 %	-
	1 MHz		-10 %-	_____	+10 %	-
	2 MHz		-10 %-	_____	+10 %	-
	3 MHz		-10 %-	_____	+10 %	-
	5 MHz		-15 %-	_____	+15 %	-
	10 MHz		-10 %-	_____	+25 %	-
11	IF bandwidths Shape factor	1.15				
	100 Hz		-	_____	6	-
	1 kHz		-	_____	12	-
	2 kHz		-	_____	12	-
	3 kHz		-	_____	12	-
	5 kHz		-	_____	12	-
	10 kHz		-	_____	12	-
	20 kHz		-	_____	12	-
	30 kHz		-	_____	12	-
	50 kHz		-	_____	12	-
	100 kHz		-	_____	12	-
	200 kHz		-	_____	12	-
	300 kHz		-	_____	12	-
	500 kHz		-	_____	12	-
	1 MHz		-	_____	12	-
	2 MHz		-	_____	12	-
	3 MHz		-	_____	7	-
	5 MHz		-	_____	7	-
	10 MHz		-	_____	7	-
12	LO feedthrough	1.16	-	_____	-20	dBm

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
13	Noise display f_n	1.16				
	FSIQ3:					
	20 Hz		-	_____	-80	dBm
	1 kHz		-	_____	-110	dBm
	9.9 kHz		-	_____	-125	dBm
	95 kHz		-	_____	-135	dBm
	999 kHz		-	_____	-145	dBm
	9.99 MHz		-	_____	-145	dBm
	19.99 MHz		-	_____	-145	dBm
	49.99 MHz		-	_____	-145	dBm
	99.99 MHz		-	_____	-145	dBm
	199.99 MHz		-	_____	-145	dBm
	499.99 MHz		-	_____	-145	dBm
	999.9 MHz		-	_____	-145	dBm
	1999.9 MHz		-	_____	-145	dBm
	3499.9 MHz		-	_____	-145	dBm
	FSIQ7:					
	20 Hz		- -	_____	-74	dBm
	1 kHz		-	_____	-104	dBm
	9.9 kHz		-	_____	-119	dBm
	95 kHz		-	_____	-129	dBm
	999 kHz		-	_____	-142	dBm
	9.99 MHz		-	_____	-142	dBm
	19.99 MHz		-	_____	-142	dBm
	49.99 MHz		-	_____	-142	dBm
	99.99 MHz		-	_____	-142	dBm
	199.99 MHz		-	_____	-142	dBm
	499.99 MHz		-	_____	-142	dBm
	999.9 MHz		-	_____	-142	dBm
	1999.9 MHz		-	_____	-142	dBm
	3499.9 MHz		-	_____	-142	dBm
	5999.9 MHz		-	_____	-142	dBm
	6999.9 MHz		-		-139	dBm
	FSIQ26:			_____		
	20 Hz		-	_____	-74	dBm
	1 kHz		-	_____	-104	dBm
	9.9 kHz		-	_____	-119	dBm
	95 kHz		-	_____	-129	dBm
	999 kHz		-	_____	-142	dBm
	9.99 MHz		-	_____	-138	dBm
	19.99 MHz		-	_____	-138	dBm
	49.99 MHz		-	_____	-138	dBm
	99.99 MHz		-	_____	-138	dBm
	199.99 MHz		-	_____	-138	dBm
	499.99 MHz		-	_____	-138	dBm
	999.9 MHz		-	_____	-138	dBm
	1999.9 MHz		-	_____	-138	dBm
	3499.9 MHz		-	_____	-138	dBm
	5999.9 MHz		-	_____	-138	dBm
	6999.9 MHz		-	_____	-135	dBm
	7199.9 MHz		-	_____	-138	dBm
	11999.9 MHz		-	_____	-138	dBm
	17999.9 MHz		-	_____	-138	dBm
	21999.9 MHz		-	_____	-135	dBm
	26399.9 MHz		-	_____	-135	dBm

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
13	Noise display f_n	1.16				
	FSIQ40:					
	20 Hz		-	———	-74	dBm
	1 kHz		-	———	-104	dBm
	9,9 kHz		-	———	-119	dBm
	95 kHz		-	———	-129	dBm
	999 kHz		-	———	-142	dBm
	9,99 MHz		-	———	-138	dBm
	19,99 MHz		-	———	-138	dBm
	49,99 MHz		-	———	-138	dBm
	99,99 MHz		-	———	-138	dBm
	199,99 MHz		-	———	-138	dBm
	499,99 MHz		-	———	-138	dBm
	999,9 MHz		-	———	-138	dBm
	1999,9 MHz		-	———	-138	dBm
	3499,9 MHz		-	———	-138	dBm
	5999,9 MHz		-	———	-138	dBm
	6999,9 MHz		-	———	-135	dBm
	7199,9 MHz		-	———	-134	dBm
	11999,9 MHz		-	———	-134	dBm
	17999,9 MHz		-	———	-134	dBm
	21999,9 MHz		-	———	-131	dBm
	26499,9 MHz		-	———	-131	dBm
	27000 MHz		-	———	-120	dBm
	29999 MHz		-	———	-120	dBm
	30000 MHz		-	———	-116	dBm
	35000 MHz		-	———	-116	dBm
	40000 MHz		-	———	-116	dBm

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
14	Frequency response	1.17				
	Instrument models 03/07/26:					
	RF attenuation (a_{ATT}): 10 dB					
	FSIQ3 / FSIQ7 / FSIQ26:					
	120 MHz (absolute error)		-0,3	———	+0,3	dB
	f_{fresp}					
	1 MHz		-0,5	———	+0,5	dB
	10 MHz		-0,5	———	+0,5	dB
	50 MHz		-0,5	———	+0,5	dB
	100 MHz		-0,5	———	+0,5	dB
	200 MHz		-0,5	———	+0,5	dB
	300 MHz		-0,5	———	+0,5	dB
	400 MHz		-0,5	———	+0,5	dB
	500 MHz		-0,5	———	+0,5	dB
	600 MHz		-0,5	———	+0,5	dB
	700 MHz		-0,5	———	+0,5	dB
	800 MHz		-0,5	———	+0,5	dB
	900 MHz		-0,5	———	+0,5	dB
	1000 MHz		-0,5	———	+0,5	dB
	1500 MHz		-0,5	———	+0,5	dB
	2000 MHz		-1	———	+1	dB
	2200 MHz		-1	———	+1	dB
	2500 MHz		-1	———	+1	dB
	3000 MHz		-1	———	+1	dB
	3499 MHz		-1	———	+1	dB
	FSIQ7 / FSIQ26:					
	4000 MHz		-1	———	+1	dB
	4500 MHz		-1	———	+1	dB
	5000 MHz		-1	———	+1	dB
	5500 MHz		-1	———	+1	dB
	6000 MHz		-1	———	+1	dB
	6500 MHz		-1	———	+1	dB
	6999 MHz		-1	———	+1	dB
	FSIQ26:					
	8000 MHz		-2	———	+2	dB
	9000 MHz		-2	———	+2	dB
	10000 MHz		-2	———	+2	dB
	11000 MHz		-2	———	+2	dB
	12000 MHz		-2	———	+2	dB
	13000 MHz		-2	———	+2	dB
	14000 MHz		-2	———	+2	dB
	15000 MHz		-2	———	+2	dB
	16000 MHz		-2	———	+2	dB
	17000 MHz		-2	———	+2	dB
	18000 MHz		-2	———	+2	dB
	19000 MHz		-2,5	———	+2,5	dB
	20000 MHz		-2,5	———	+2,5	dB
	21000 MHz		-2,5	———	+2,5	dB
	22000 MHz		-2,5	———	+2,5	dB
	23000 MHz		-2,5	———	+2,5	dB
	24000 MHz		-2,5	———	+2,5	dB
	25000 MHz		-2,5	———	+2,5	dB
	26000 MHz		-2,5	———	+2,5	dB
	26499 MHz		-2,5	———	+2,5	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
14	Frequency response	1.17				
	Instrument models 13/17/27/40:					
	RF attenuation (a_{ATT}): 10 dB					
	FSIQ3 / FSIQ7 / FSIQ26 /FSIQ40:					
	120 MHz (absolute error)		-0,2	———	+0,2	dB
	f_{fresp}					
	1 MHz		-0,3	———	+0,3	dB
	10 MHz		-0,3	———	+0,3	dB
	50 MHz		-0,3	———	+0,3	dB
	100 MHz		-0,3	———	+0,3	dB
	200 MHz		-0,3	———	+0,3	dB
	300 MHz		-0,3	———	+0,3	dB
	400 MHz		-0,3	———	+0,3	dB
	500 MHz		-0,3	———	+0,3	dB
	600 MHz		-0,3	———	+0,3	dB
	700 MHz		-0,3	———	+0,3	dB
	800 MHz		-0,3	———	+0,3	dB
	900 MHz		-0,3	———	+0,3	dB
	1000 MHz		-0,3	———	+0,3	dB
	1500 MHz		-0,3	———	+0,3	dB
	2000 MHz		-0,3	———	+0,3	dB
	2200 MHz		-0,3	———	+0,3	dB
	2500 MHz		-1	———	+1	dB
	3000 MHz		-1	———	+1	dB
	3499 MHz		-1	———	+1	dB
	FSIQ7 / FSIQ26 / FSIQ40:					
	4000 MHz		-1	———	+1	dB
	4500 MHz		-1	———	+1	dB
	5000 MHz		-1	———	+1	dB
	5500 MHz		-1	———	+1	dB
	6000 MHz		-1	———	+1	dB
	6500 MHz		-1	———	+1	dB
	6999 MHz		-1	———	+1	dB
	FSIQ26 / FSIQ40:					
	8000 MHz		-2	———	+2	dB
	9000 MHz		-2	———	+2	dB
	10000 MHz		-2	———	+2	dB
	11000 MHz		-2	———	+2	dB
	12000 MHz		-2	———	+2	dB
	13000 MHz		-2	———	+2	dB
	14000 MHz		-2	———	+2	dB
	15000 MHz		-2	———	+2	dB
	16000 MHz		-2	———	+2	dB
	17000 MHz		-2	———	+2	dB
	18000 MHz		-2	———	+2	dB
	19000 MHz		-2,5	———	+2,5	dB
	20000 MHz		-2,5	———	+2,5	dB
	21000 MHz		-2,5	———	+2,5	dB
	22000 MHz		-2,5	———	+2,5	dB
	23000 MHz		-2,5	———	+2,5	dB
	24000 MHz		-2,5	———	+2,5	dB
	25000 MHz		-2,5	———	+2,5	dB
	26000 MHz		-2,5	———	+2,5	dB
	26499 MHz		-2,5	———	+2,5	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
14	Frequency response Instrument models 13/17/27/40: RF attenuation (a_{ATT}): 10 dB **FSIQ40:**	1.17				
	27000 MHz		-3	———	+3	dB
	28000 MHz		-3	———	+3	dB
	29000 MHz		-3	———	+3	dB
	30000 MHz		-3	———	+3	dB
	31000 MHz		-3	———	+3	dB
	32000 MHz		-3	———	+3	dB
	33000 MHz		-3	———	+3	dB
	34000 MHz		-3	———	+3	dB
	35000 MHz		-3	———	+3	dB
	36000 MHz		-3	———	+3	dB
	37000 MHz		-3	———	+3	dB
	38000 MHz		-3	———	+3	dB
	39000 MHz		-3	———	+3	dB
	40000 MHz		-3	———	+3	dB
14	Frequency response Instrument models 13/17/27/40: RF attenuation (a_{ATT}): 20 dB **FSIQ3 / FSIQ7 / FSIQ26 /FSIQ40:**	1.17				
	120 MHz (absolute error)		-0,2	———	+0,2	dB
	f_{fresp}					
	1 MHz		-0.45	———	+0.45	dB
	10 MHz		-0.45	———	+0.45	dB
	50 MHz		-0.45	———	+0.45	dB
	100 MHz		-0.45	———	+0.45	dB
	200 MHz		-0.45	———	+0.45	dB
	300 MHz		-0.45	———	+0.45	dB
	400 MHz		-0.45	———	+0.45	dB
	500 MHz		-0.45	———	+0.45	dB
	600 MHz		-0.45	———	+0.45	dB
	700 MHz		-0.45	———	+0.45	dB
	800 MHz		-0.45	———	+0.45	dB
	900 MHz		-0.45	———	+0.45	dB
	1000 MHz		-0.45	———	+0.45	dB
	1500 MHz		-0.45	———	+0.45	dB
	2000 MHz		-0.45	———	+0.45	dB
	2200 MHz		-0.45	———	+0.45	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
14	Frequency response	1.17				
	Instrument models 13/17/27/40:					
	RF attenuation (a_{ATT}): 30 dB					
	FSIQ3 / FSIQ7 / FSIQ26 /FSIQ40:					
	120 MHz (absolute error)		-0,2	———	+0,2	dB
	f_{fresp}					
	1 MHz		-0.45	———	+0.45	dB
	10 MHz		-0.45	———	+0.45	dB
	50 MHz		-0.45	———	+0.45	dB
	100 MHz		-0.45	———	+0.45	dB
	200 MHz		-0.45	———	+0.45	dB
	300 MHz		-0.45	———	+0.45	dB
	400 MHz		-0.45	———	+0.45	dB
	500 MHz		-0.45	———	+0.45	dB
	600 MHz		-0.45	———	+0.45	dB
	700 MHz		-0.45	———	+0.45	dB
	800 MHz		-0.45	———	+0.45	dB
	900 MHz		-0.45	———	+0.45	dB
	1000 MHz		-0.45	———	+0.45	dB
	1500 MHz		-0.45	———	+0.45	dB
	2000 MHz		-0.45	———	+0.45	dB
	2200 MHz		-0.45	———	+0.45	dB
	2200 MHz		-0.45	———	+0.45	dB
14	Frequency response	1.17				
	Instrument models 13/17/27/40:					
	RF attenuation (a_{ATT}): 40 dB					
	FSIQ3 / FSIQ7 / FSIQ26 /FSIQ40:					
	120 MHz (absolute error)		-0,2	———	+0,2	dB
	f_{fresp}					
	1 MHz		-0.45	———	+0.45	dB
	10 MHz		-0.45	———	+0.45	dB
	50 MHz		-0.45	———	+0.45	dB
	100 MHz		-0.45	———	+0.45	dB
	200 MHz		-0.45	———	+0.45	dB
	300 MHz		-0.45	———	+0.45	dB
	400 MHz		-0.45	———	+0.45	dB
	500 MHz		-0.45	———	+0.45	dB
	600 MHz		-0.45	———	+0.45	dB
	700 MHz		-0.45	———	+0.45	dB
	800 MHz		-0.45	———	+0.45	dB
	900 MHz		-0.45	———	+0.45	dB
	1000 MHz		-0.45	———	+0.45	dB
	1500 MHz		-0.45	———	+0.45	dB
	2000 MHz		-0.45	———	+0.45	dB
	2200 MHz		-0.45	———	+0.45	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
15	Display linearity	1.19				
	Instrument models 03/07/26:					
	a_{ATT}					
	6 dB		9.7	_____	10.3	dB
	8 dB		7.7	_____	8.3	dB
	10 dB		5.7	_____	6.3	dB
	12 dB		3.7	_____	4.3	dB
	14 dB		1.7	_____	2.3	dB
	16 dB		-	Reference	-	-
	18 dB		-2.3	_____	-1.7	dB
	20 dB		-4.3	_____	-3.7	dB
	22 dB		-6.3	_____	-5.7	dB
	24 dB		-8.3	_____	-7.7	dB
	26 dB		-10.3	_____	-9.7	dB
	28 dB		-12.3	_____	-11.7	dB
	30 dB		-14.3	_____	-13.7	dB
	32 dB		-16.3	_____	-15.7	dB
	34 dB		-18.3	_____	-17.7	dB
	36 dB		-20.3	_____	-19.7	dB
	38 dB		-22.3	_____	-21.7	dB
	40 dB		-24.3	_____	-23.7	dB
	42 dB		-26.3	_____	-25.7	dB
	44 dB		-28.3	_____	-27.7	dB
	46 dB		-30.3	_____	-29.7	dB
	48 dB		-32.3	_____	-31.7	dB
	50 dB		-34.3	_____	-33.7	dB
	52 dB		-36.3	_____	-35.7	dB
	54 dB		-38.3	_____	-37.7	dB
	56 dB		-40.3	_____	-39.7	dB
	61 dB		-45.3	_____	-44.5	dB
	66 dB		-50.5	_____	-49.5	dB
	71 dB		-55.5	_____	-54.5	dB
	76 dB		-60.5	_____	-59.5	dB
	81 dB		-66.0	_____	-64.0	dB
	86 dB		-71.0	_____	-69.0	dB
	91 dB		-76.0	_____	-74.0	dB
	96 dB		-81.0	_____	-79.0	dB
	101 dB		-86.0	_____	-84.0	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
15	Display linearity	1.19				
	Instrument models 13/17/27/40:					
	a_{ATT}					
	6 dB		9.8	_____	10.2	dB
	8 dB		7.8	_____	8.2	dB
	10 dB		5.8	_____	6.2	dB
	12 dB		3.8	_____	4.2	dB
	14 dB		1.8		2.2	dB
	16 dB		-	Reference	-	-
	18 dB		-2.2	_____	-1.8	dB
	20 dB		-4.2	_____	-3.8	dB
	22 dB		-6.2	_____	-5.8	dB
	24 dB		-8.2	_____	-7.8	dB
	26 dB		-10.2	_____	-9.8	dB
	28 dB		-12.2	_____	-11.8	dB
	30 dB		-14.2	_____	-13.8	dB
	32 dB		-16.2	_____	-15.8	dB
	34 dB		-18.2	_____	-17.8	dB
	36 dB		-20.2	_____	-19.8	dB
	38 dB		-22.2	_____	-21.8	dB
	40 dB		-24.2	_____	-23.8	dB
	42 dB		-26.2	_____	-25.8	dB
	44 dB		-28.2	_____	-27.8	dB
	46 dB		-30.2	_____	-29.8	dB
	48 dB		-32.2	_____	-31.8	dB
	50 dB		-34.2	_____	-33.8	dB
	52 dB		-36.2	_____	-35.8	dB
	54 dB		-38.2	_____	-37.8	dB
	56 dB		-40.2	_____	-39.8	dB
	61 dB		-45.2	_____	-44.8	dB
	66 dB		-20.2	_____	-49.8	dB
	71 dB		-22.2	_____	-84.8	dB
	76 dB		-60.2	_____	-89.8	dB
	81 dB		-66.2	_____	-64.8	dB
	86 dB		-71.0	_____	-69.0	dB
	91 dB		-76.0	_____	-74.0	dB
	96 dB		-81.0	_____	-79.0	dB
	101 dB		-86.0	_____	-84.0	dB
16	Attenuator (1-dB-attenuator off)	1.20				
	Instrument models 03/07/26:					
	a_{ATT}					
	70		-70.3	_____	-69.7	dBm
	60		-60.3	_____	-59.7	dBm
	50		-50.3	_____	-49.7	dBm
	40		-40.3	_____	-39.7	dBm
	30		-30.3	_____	-29.7	dBm
	20		-20.3	_____	-19.7	dBm
	10		-10.3	_____	-9.7	dBm
	0		-0.3	_____	+0.3	dBm

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
16	Attenuator (1-dB-attenuator off)	1.20				
	Instrument models 13/17/27/40:					
	a_{ATT}					
	70		-70.3	_____	-69.7	dBm
	60		-60.3	_____	-59.7	dBm
	50		-50.3	_____	-49.7	dBm
	40		-40.1	_____	-39.9	dBm
	30		-30.1	_____	-29.9	dBm
	20		-20.1	_____	-19.9	dBm
	10		-10.1	_____	-9.9	dBm
	0		-0.3	_____	+0.3	dBm
17	IF gain switching	1.21				
	Reference level					
	0 dBm		-10.2	_____	-9.8	dBm
	-10 dBm		-20.2	_____	-19.8	dBm
	-20 dBm		-30.2	_____	-29.8	dBm
	-30 dBm		-40.2	_____	-39.8	dBm
	-40 dBm		-50.2	_____	-49.8	dBm
	-50 dBm		-60.2	_____	-59.8	dBm
	-31 dBm		-41.2	_____	-40.8	dBm
	-32 dBm		-42.2	_____	-41.8	dBm
	-33 dBm		-43.2	_____	-42.8	dBm
	-34 dBm		-44.2	_____	-43.8	dBm
	-35 dBm		-45.2	_____	-44.8	dBm
	-36 dBm		-46.2	_____	-45.8	dBm
	-37 dBm		-47.2	_____	-46.8	dBm
	-38 dBm		-48.2	_____	-47.8	dBm
	-39 dBm		-49.2	_____	-48.8	dBm
18	Phase noise	1.23				
	Instrument models 03/07/26:					
	offset:					
	FSIQ3:			_____		
	100 Hz		-	_____	-87	dBc/Hz
	1 kHz		-	_____	-107	dBc/Hz
	10 kHz		-	_____	-120	dBc/Hz
	100 kHz		-	_____	-117	dBc/Hz
	1 MHz		-		-135	dBc/Hz
	FSIQ7 / FSIQ26:					
	100 Hz		-	_____	-81	dBc/Hz
	1 kHz		-	_____	-100	dBc/Hz
	10 kHz		-	_____	-114	dBc/Hz
	100 kHz		-	_____	-111	dBc/Hz
	1 MHz		-	_____	-129	dBc/Hz

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
18	Phase noise	1.23				
	Instrument models 13/17/27/40:					
	offset:					
	FSIQ3:		-	———	-87	dBc/Hz
	100 Hz		-	———	-107	dBc/Hz
	1 kHz		-	———	-120	dBc/Hz
	10 kHz		-	———	-119	dBc/Hz
	100 kHz		-	———	-138	dBc/Hz
	1 MHz					
	FSIQ7 / FSIQ26/ FSIQ40					
	100 Hz		-	———	-81	dBc/Hz
	1 kHz		-	———	-100	dBc/Hz
	10 kHz		-	———	-114	dBc/Hz
	100 kHz		-	———	-113	dBc/Hz
	1 MHz		-	———	-132	dBc/Hz
19	Option tracking generator	1.25				
	output level					
	0 dBm		-1	———	+1	dBm
	–3 dBm		-4	———	-2	dBm
	–6 dBm		-8	———	-4	dBm
	–10 dBm		-12	———	-8	dBm
	–20 dBm		-21	———	-19	dBm
20	Option tracking generator	1.25				
	frequency response					
	1 MHz to 1 GHz		-2	———	2	dBm
	1 GHz to 3.5 GHz		-3	———	3	dBm
	3.5 GHz to 7 GHz		-3	———	3 (typ)	dBm
21	Option tracking generator	1.25				
	I/Q-modulator					
	residual carrier		-	———	-46	dBm
	imbalance		-10	———	-8	dBm
	quadrature offset		- 7	———	-5	dBm
22	Option external mixer output	1.27				
	LO-level					
	f_{Center}					
	150.7414 GHz		12.5	———	18.5	dBm
	160.7414 GHz		12.5	———	18.5	dBm
	170.7414 GHz		12.5	———	18.5	dBm
	180.7414 GHz		12.5	———	18.5	dBm
	190.7414 GHz		12.5	———	18.5	dBm
	200.7414 GHz		12.5	———	18.5	dBm
	210.7414 GHz		12.5	———	18.5	dBm
	220.7414 GHz		12.5	———	18.5	dBm
	230.7414 GHz		12.5	———	18.5	dBm
	240.7414 GHz		12.5	———	18.5	dBm
	250.7414 GHz		12.5	———	18.5	dBm
	260.7414 GHz		12.5	———	18.5	dBm
	270.7414 GHz		12.5	———	18.5	dBm
	280.7414 GHz		12.5	———	18.5	dBm
	290.7414 GHz		12.5	———	18.5	dBm
	300.7414 GHz		12.5	———	18.5	dBm
	303.6586 GHz					

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
23	Option FSE-B13, 1 dB attenuator a_{ATT}	1.28				
	20		–20.15	_____	–19.85	dBm
	19		–19.15	_____	–18.85	dBm
	18		–18.15	_____	–17.85	dBm
	17		–17.15	_____	–16.85	dBm
	16		–16.15	_____	–15.85	dBm
	15		–15.15	_____	–14.85	dBm
	14		–14.15	_____	–13.85	dBm
	13		–13.15	_____	–12.85	dBm
	12		–12.15	_____	–11.85	dBm
	11		–11.15	_____	–10.85	dBm
Digital demodulation						
24	Absolute accuracy of level display	1.29	-0.4	_____	+0.4	dB
25	Linearity of level display	1.29				
	a = 10 dB		-0.2	_____	+0.2	dB
	a = 30 dB		-0.85	_____	+0.85	dB
	a = 50 dB		-1.5	_____	+1.5	dB
26	Useful dynamic range	1.30				
	GSM		67.3	_____	-	dB
	NADC FORWARD CH		72	_____	-	dB
Residual error - no FSK; FSIQ 3:		1.31				
27	**GSM**					
	EVM rms		-	_____	1	%
	Magnitude error rms		-	_____	1	%
	Phase Error rms		-	_____	0.5	°
	Phase Error pk		-	_____	2.1	°
	I/Q offset		-	_____	0.2	%
	Freq error		-1.45	_____	1.45	Hz
28	**NADC (PDC, TETRA)**					
	EVM rms		-	_____	0.5	%
	EVM pk		-	_____	2.1	%
	Magnitude error rms		-	_____	0.5	%
	I/Q offset		-	_____	0.2	%
	Freq error		-0.22	_____	+ 0.22	Hz
29	**PHS**					
	EVM rms		-	_____	1	%
	EVM pk		-	_____	4.5	%
	Magnitude error rms		-	_____	1	%
	I/Q offset		-	_____	0.2	%
	Freq error		-1.06	_____	+ 1.06	Hz

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
Residual error - no FSK; FSIQ 3:		1.31				
30	**IS95 CDMA FWD CH:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	Hz
	Freq error:		-6.2	_____	+ 6.2	-
	RHO factor		0.9995		-	
31	**IS95 CDMA REV CH:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	Hz
	Freq error:		-6.2	_____	+ 6.2	-
	RHO factor		0.9995		-	
32	**W-CDMA 4.096 FWD CH:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	Hz
	Freq error:		-20	_____	+ 20	-
	RHO factor		0.9995		-	
33	**QPSK 6.4M:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	%
	Freq error:		-20	_____	+ 20	Hz
	RHO factor		0.9995		-	-
Residual error-no FSK; FSIQ7, FSIQ26, FSIQ40:		1.31				
34	**GSM**					
	EVM rms:		-	_____	1.4	%
	Magnitude error rms:		-	_____	1,4	%
	Phase Error rms:		-	_____	0.7	°
	Phase Error pk:		-	_____	3	°
	I/Q offset:		-	_____	0.28	%
	Freq error:		-2	_____	2	Hz
35	**NADC (PDC, TETRA)**					
	EVM rms:		-	_____	0.7	%
	EVM pk:		-	_____	3	%
	Magnitude error rms:		-	_____	0.7	%
	I/Q offset:		-	_____	0.28	%
	Freq error:		-0.3	_____	+ 0.3	Hz

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
Residual error-no FSK; FSIQ7, FSIQ26, FSIQ40:		1.31				
36	**PHS**					
	EVM rms:		-	_____	1.4	%
	EVM pk:		-	_____	6.3	%
	Magnitude error rms:		-	_____	1.4	%
	I/Q offset:		-	_____	0.28	%
	Freq error:		-1.4	_____	+ 1.4	Hz
37	**IS95 CDMA FWD CH:**					
	EVM rms:		-	_____	2.8	%
	EVM pk:		-	_____	12.7	%
	Magnitude error rms:		-	_____	2.8	%
	I/Q offset:		-	_____	0.28	%
	Freq error:		-8.7	_____	+ 8.7	Hz
	RHO factor		0.9993	_____	-	-
38	**IS95 CDMA REV CH:**					
	EVM rms:		-	_____	2.8	%
	EVM pk:		-	_____	12.7	%
	Magnitude error rms:		-	_____	2.8	%
	I/Q offset:		-	_____	0.28	%
	Freq error:		-8.7	_____	+ 8.7	Hz
	RHO factor		0.9993		-	-
39 (FSIQ7 only)	**W-CDMA 4.096 FWD CH:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	%
	Freq error:		-20	_____	+ 20	Hz
	RHO factor		0.9995	_____	-	-
40 (FSIQ7 only)	**QPSK 6.4M:**					
	EVM rms:		-	_____	2	%
	EVM pk:		-	_____	9	%
	Magnitude error rms:		-	_____	2	%
	I/Q offset:		-	_____	0.2	%
	Freq error:		-20	_____	+ 20	Hz
	RHO factor		0.9995	_____	-	-
Residual error FSK; FSIQ 3:		1.35				
41	**ERMES:**					
	Magnitude error rms:		-	_____	1	%
	FSK Dev Error rms		-	_____	93.8	Hz
	FSK DEV of nom.		-70.3	_____	70.3	Hz
	Frequency error		-23.4	_____	23.4	Hz

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
Residual error FSK; FSIQ 3:		1.35				
42	**CT2:**					
	Magnitude error rms:		-	_____	1	%
	FSK Dev Error rms		-	_____	270	Hz
	FSK DEV of nom.		-270	_____	270	Hz
	Frequency error		-90	_____	90	Hz
43	**DECT:**					
	Magnitude error rms:		-	_____	2	%
	FSK Dev Error rms		-	_____	5.76	kHz
	FSK DEV of nom.		-5.76	_____	5.76	kHz
	Frequency error		-1.44	_____	1.44	kHz
Residual error FSK; FSIQ7, FSIQ26, FSIQ40		1.35				
44	**ERMES:**					
	Magnitude error rms:		-	_____	1.4	%
	FSK Dev Error rms		-	_____	131.3	Hz
	FSK DEV of nom.		-98.4	_____	98.4	Hz
	Frequency error		-32.7	_____	32.7	Hz
45	**CT2:**					
	Magnitude error rms:		--	_____	1.4	%
	FSK Dev Error rms		--	_____	378	Hz
	FSK DEV of nom.		-378	_____	378	Hz
	Frequency error		-126	_____	126	Hz
46	**DECT:**					
	Magnitude error rms:		-	_____	2.8	%
	FSK Dev Error rms		-	_____	8	kHz
	FSK DEV of nom.		-8	_____	8	kHz
	Frequency error		-2	_____	2	kHz
Analog demodulation *All FSIQ models, measurements marked with *) with FSIQ3 only.*						
	REAL TIME OFF	1.36				
47	**Measurement error with AM demodulation**	1.36				
	DEMOD BW 5 kHz IF BW 30 kHz AF 500 Hz		47.5	_____	52.5	% AM
	DEMOD BW 200 kHz IF BW 1 MHz AF 10 kHz		47.5	_____	52.5	% AM
	Demod BW 2 MHz IF BW 10 MHz AF 50 kHz		47.5	_____	52.5	% AM

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
48	**Spurious AM**	1.36				
	DEMOD BW 5 kHz IF BW: 30 kHz		--	_____	0.2	% AM
	DEMOD BW 200 kHz IF BW 1MHz		--	_____	0.28	% AM
	DEMOD BW 2 MHz IF BW: 10 MHz		--	_____	0.89	% AM
49	**Measurement error with FM Demodulation**	1.37				
	DEMOD BW 200 kHz IF BW 1 MHz AF 1KHz Δf=40 kHz		38	_____	42	kHz
	Demod BW 2 MHz IF BW 10 MHz AF 100 kHz Δf= 200 kHz		190	_____	210	kHz
50	**Spurious FM *)**	1.37				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	10	Hz
51	**Measurement error with PM Demodulation**	1.37	--			
	DEMOD BW: 500 kHz IF BW: 3 MHz Phasenhub= 10 rad AF= 1kHz		9.5	_____	10.5	rad
52	**Spurious PM *)**	1.37				
	DEMOD BW: 5 kHz IF BW: 30 kHz		--	_____	0.03	rad
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	0.03	rad
53	**Carrier Power**	1.38				
	DEMOD BW: 200 kHz IF BW: 1 MHz Level: -10 dBm		-11.5	_____	-8.5	dBm
	DEMOD BW: 200 kHz IF BW: 1 MHz Level: -50 dBm		-41.5	_____	-38.5	dBm
54	**Audio frequency measurement**	1.38				
	DEMOD BW: 5 kHz IF BW: 30 kHz Hub 2kHz, AF 10 Hz		9.993	_____	10.007	Hz
	DEMOD BW: 2 MHz IF BW: 1 MHz Hub 100 kHz, AF 100 kHz		99.9979	_____	100.003	kHz

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
	REAL TIME ON	1.38				
55	**Measurement error with AM Demodulation**	1.38				
	DEMOD BW 200 kHz IF BW 1 MHz AF 30 Hz		47.5	_____	52.5	% AM
	DEMOD BW 200 kHz IF BW 1 MHz AF 1k Hz		47.5	_____	52.5	% AM
	DEMOD BW 200 kHz IF BW 1 MHz AF 20 kHz		47.5	_____	52.5	% AM
56	**Spurious AM**	1.38				
	DEMOD BW 5 kHz IF BW: 30 kHz		--	_____	0.2	% AM
	DEMOD BW 200 kHz IF BW 1MHz		--	_____	0.28	% AM
57	**Measurement error with FM Demodulation**	1.39				
	DEMOD BW 200 kHz IF BW 1 MHz AF 30 Hz Δf=40 kHz		38	_____	42	kHz
	DEMOD BW 200 kHz IF BW 1 MHz AF 1KHz Δf=40 kHz		38	_____	42	kHz
	DEMOD BW 200 kHz IF BW 1 MHz AF 20 KHz Δf=40 kHz		38	_____	42	kHz
58	**Spurious FM *)**	1.39				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	10	Hz
59	**Measurement error with PM Demodulation**	1.39				
	DEMOD BW: 200 kHz IF BW: 1 MHz Phase deviation = 10 rad AF= 8 kHz		9.5	_____	10.5	rad
60	**Spurious PM *)**	1.39				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	0.01	rad

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
61	**Carrier Power**	1.40				
	DEMOD BW: 200 kHz IF BW: 1 MHz Level: -10 dBm		-11.5	_____	-8.5	dBm
	DEMOD BW: 200 kHz IF BW: 1 MHz Level: - 40 dBm		-41.5	_____	-38.5	dBm
62	**Audio frequency measurement**	1.40				
	DEMOD BW: 10 kHz IF BW: 50 kHz AF 30 Hz		29.988	_____	30.012	Hz
	DEMOD BW: 200 kHz IF BW: 1 MHz AF: 20 kHz		19.9997	_____	20.0003	kHz
63	**SINAD with AM:** DEMOD BW: 200kHz IF BW: 1 MHz, AF= 1kHz	1.40	46	_____	--	db
64	**SINAD with FM:** Δf=10kHz AF=1 kHz DEMOD BW: 200kHz IF BW: 1 MHz	1.41	50	_____	--	dB
65	**SINAD with PM:** Phase deviation= 10 rad AF= 1kHz DEMOD BW: 200kHz IF BW: 1 MHz	1.41	50	_____	--	dB
66	**Function AUDIO output**	1.41				
	Volume 0%		no audible tone	_____	--	--
	Volume 50 %		audible 1 kHz tone	_____	--	--
	FSIQ7, FSIQ26, FSIQ40					
	REAL TIME OFF					
67	**Spurious FM**	1.37				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	20	Hz
68	**Spurious PM**	1.37				
	DEMOD BW: 5 kHz IF BW: 30 kHz		--	_____	0.06	rad
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	0.06	rad

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
	REAL TIME ON					
69	**Spurious FM**	1.39				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	20	Hz
70	**Spurious PM**	1.39				
	DEMOD BW: 200 kHz IF BW: 1 MHz		--	_____	0.02	rad

Test Instructions for Instrument Models 03/07/26 with Option FSE-B22

Checking the Calibration Source at 120 MHz

Test equipment:

- signal generator (table 1-1, item 3):
  frequency 120 MHz
  level -40 dBm
- power meter (table 1-1, item 7)
- power sensor (table 1-1, item 8)
  frequency 120 MHz
  maximum power $P_{max} \geq 1$ µW
  meter noise ≤ 20 pW
  RSS ≤ 0.8% referred to indicated power
  impedance Z = 50 Ω

Power meter settings:

➢ connect power sensor to power meter and carry out function ´ZERO´ when no signal is applied to the power sensor.

➢ connect power sensor to RF output of signal generator.

Signal generator settings:

- frequency 120 MHz
- level -40 dBm ± 0.1 dB
  Use power meter for exact level adjustment.

Test setup:

➢ connect RF output of the signal generator to RF input of the FSIQ

FSIQ settings:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**FREQUENCY SPAN** : **15 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**LEVEL REF** : REF LEVEL : **-10 dBm**]
- [**INPUT** : RF ATTEN MANUAL : **20 dB**]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

➢ switch internal reference generator to RF input
[**CONFIGURATION SETUP** : SERVICE : INPUT CAL]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The reading ´Delta 1 [T1 FXD]´ displays the difference between the output level of the signal generator and the level of the calibration source ..... < 0.2 dB

Note: *The level of the calibration source can be adjusted with R22 on FracSyn module.*

Checking IF Filters

Test equipment: signal generator (table 1-1, item 3):
frequency 120 MHz
level ≥ -10 dBm

Test setup:
➢ connect RF output of the signal generator to the RF input of the FSIQ.

Checking the Level Error

Reference Measurement (RBW 5 kHz)

Signal generator settings:
- frequency: 120 MHz
- level: -20 dBm

FSIQ settings:
- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **120 MHz**]
- [**SWEEP COUPLING** : COUPLING RATIO : RBW/VBW SINE [1]]
- [**SWEEP COUPLING** : COUPLING RATIO : SPAN/RBW MANUAL : **5** : **ENTER**]
- resolution bandwidth 5 kHz
  [**FREQUENCY SPAN** : **25 kHz**]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

Checking the Level Error

FSIQ settings:
- [**FREQUENCY SPAN** : {5 x RBW}]

See table 1-3 (item 2) of performance test report for values of RBW.

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

The level error is displayed by the reading
´Delta 1 [T1 FXD] {level error} dB´.

Evaluation:
See table 1-3 (item 2) of performance test report for upper and lower limits of level error.

Checking the Frequency Response

Test equipment:

- signal generator (table 1-1, item 3)
  frequency range 1 MHz to 2 GHz
  maximum level ≥ -10 dBm
- power meter (table 1-1, item 7)
- power sensor (table 1-1, item 8)
  frequency range 1 MHz to 2 GHz
  maximum power $P_{max} \geq 100$ µW
  RSS referred to indicated power ≤ 0.8 %
  impedance Z = 50 Ω
- 6-dB divider (section 5.3, item 2)
  frequency range 1 MHz to 2 GHz
  level imbalance[1] ≤ 0.1 dB

[1] If a power splitter with higher level imbalance is used correction of the measured frequency response is recommended.

Determining the absolute error at 120 MHz

Test setup:

- ➢ connect power sensor (table 1-1, item 8) to the power meter and execute function ´ZERO´ when there is no signal applied to the power sensor
- ➢ connect power sensor to RF output of signal generator

Signal generator settings:

- frequency 120 MHz
- level -10 dBm

Measurement:

- ➢ determine output power of the signal generator with the power meter
- ➢ connect RF output of the signal generator to RF input of the FSIQ

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : {a_{FSIQ}} **dB**]
  See
- [**LEVEL REF** : **-7 dBm**]
- [**FREQUENCY SPAN** : **15 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**FREQUENCY CENTER** : **120 MHz**]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

Evaluation:

The deviation between the signal levels measured with the power meter and the FSIQ (level reading of marker 1) reflects the absolute level error of the FSIQ. It can be calculated as

$$\text{absolute error}_{120MHz} = L_{FSIQ} - L_{powermeter}$$

Checking the frequency response

Test setup:

- ➢ connect RF output of the signal generator to input of the divider
- ➢ connect output 1 of the divider to the power sensor of the power meter
- ➢ connect output 2 of the divider to RF input of the FSIQ

Signal generator settings:

- level -10 dBm
- frequency f_{fresp}

see table 1-3 (item 3) of performance test report for instrument models 03/07/26 with option FSE-B22 for values of f_{fresp}

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **-7 dBm**]
- [**FREQUENCY SPAN** : **30 kHz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **5 kHz**]
- [**FREQUENCY CENTER** : {f_{fresp}}]

see table 1-3 (item 3) of performance test report for values of f_{fresp}

➢ activate ´preselector peak´ if center frequency is higher than 7 GHz (only available for FSIQ26)
[**SYSTEM CAL** : PRESEL PEAK]

➢ set marker to peak of signal
[**MARKER SEARCH** : PEAK]

the signal level L_{FSIQ} is displayed by the level reading of marker 1.

Power meter settings:

➢ determine signal level $L_{powermeter}$.

To achive higher accuracy it is recommended to compensate the frequency response of the power sensor.

Evaluation:

The frequency response can be calculated as

$$\text{Frequency response} = L_{FSIQ} - L_{powermeter} - \text{absolute error}_{120\ MHz}$$

Checking the Display Linearity

Test equipment:

- signal generator (table 1-1, item 3)
  frequency 5 MHz
  maximum level ≥ 6 dBm
- step attenuator (table 1-1, item 12)
  frequency 5 MHz
  attenuation 0 to 95 dB
  steps 1 dB
  maximum attenuation error < 0.05 dB

Test setup:

➢ connect RF output of the signal generator to RF input of the step attenuator

➢ connect RF output of the step attenuator to RF input of the FSIQ

Signal generator settings:

- frequency 5 MHz
- level +6 dBm

Step attenuator settings:

attenuation 16 dB

FSIQ settings:

- [**SYSTEM PRESET**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **0 dBm**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **500 Hz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **3 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**LEVEL RANGE** : LOG 100 dB]

➢ - set marker to peak of signal
[**MARKER SEARCH** : PEAK]

➢ - set reference to peak of signal
[**MARKER DELTA** : REFERENCE FIXED]

Measurement

Step attenuator settings:

attenuation $\{a_{ATT}\}$

See table 1-3 (item 4) of performance test report for instrument models 03/07/26 with option FSE-B22 for values of a_{ATT}.

Evaluation:

The difference between the level of the input signal of the FSIQ and the reference (about 10 dB below the reference level) is displayed by the reading ´Delta 1 [T1 FXD]´. Compare the measured values with the limits given in table 1-3 (item 4) of performance test report for instrument models 03/07/26 with option FSE-B22.

Checking the Attenuator

Test equipment:

- signal generator (table 1-1, item 3)
  frequency 5 MHz
  maximum level ≥ 6 dBm
- step attenuator (table 1-1, item 12)
  frequency 5 MHz
  attenuation 0 to 70 dB
  steps 10 dB
  maximum attenuation error < 0.05 dB

Test setup:

➢ connect RF output of the signal generator to RF input the step attenuator

➢ connect RF output of the step attenuator to RF input of the FSIQ

Signal generator settings:

- frequency 5 MHz
- level 0 dBm

Step attenuator settings: attenuation 60 dB

FSIQ settings:

- [**SYSTEM PRESET**]
- [**FREQUENCY CENTER** : **5 MHz**]
- [**FREQUENCY SPAN** : **500 Hz**]
- [**SWEEP COUPLING** : RES BW MANUAL : **3 kHz**]
- [**SWEEP COUPLING** : VIDEO BW MANUAL : **100 Hz**]
- [**INPUT** : RF ATTEN MANUAL : **10 dB**]
- [**LEVEL REF** : **-30 dBm**]
- [**MARKER SEARCH** : PEAK]

➢ adjust output level of the signal generator until the level reading of marker 1 is exactly -60.0 dBm.

Measurement

Step attenuator settings: attenuation {a_{ATT}}

See table below for values of a_{ATT}.

FSIQ settings:

- [**INPUT** : RF ATTEN MANUAL : {a_{FSIQ}}]
- [**LEVEL REF** : {reference level} **dBm**]
- [**MARKER SEARCH** : PEAK]

see table below for values of a_{FSIQ} and reference level.

Evaluation: Compare level reading of marker 1 with the limits given in table 1-3 (item 5) of performance test report.

a_{ATT}	40 dB	30 dB	20 dB	10 dB
a_{FSIQ}	30 dB	40 dB	50 dB	60 dB
reference level	-10 dBm	0 dBm	+10 dBm	+20 dBm

Performance Test Report for Instrument Models 03/07/26 with Option FSE-B22

Note: *The values given in the datasheet are the guaranteed limits. Due to measurement errors these limits must be extended by the tolerance of the measuring equipment used in this performance test.*

Table 1-3 Performance test report for instrument models 03/07/26 with option FSE-B22 installed

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
1	Calibration source at 120 MHz	1.66	-0.2	_____	+0.2	dB
2	IF bandwidths Level error	1.67				
	reference (Ref): 5 kHz		-	_____	-	dBm
	100 Hz		-0.15	_____	+0.15	dB
	1 kHz		-0.15	_____	+0.15	dB
	2 kHz		-0.15	_____	+0.15	dB
	3 kHz		-0.15	_____	+0.15	dB
	5 kHz		-0.15	_____	+0.15	dB
	10 kHz		-0.15	_____	+0.15	dB
	20 kHz		-0.15	_____	+0.15	dB
	30 kHz		-0.15	_____	+0.15	dB
	300 kHz		-0.15	_____	+0.15	dB
3	Frequency response	1.68				
	RF-Attenuation a_{FSIQ} = 10 dB 120 MHz (absolute error)		-0.2	_____	+0.2	dB
	f_{fresp} 1 MHz		-0.3	_____	+0.3	dB
	10 MHz		-0.3	_____	+0.3	dB
	50 MHz		-0.3	_____	+0.3	dB
	100 MHz		-0.3	_____	+0.3	dB
	200 MHz		-0.3	_____	+0.3	dB
	300 MHz		-0.3	_____	+0.3	dB
	400 MHz		-0.3	_____	+0.3	dB
	500 MHz		-0.3	_____	+0.3	dB
	600 MHz		-0.3	_____	+0.3	dB
	700 MHz		-0.3	_____	+0.3	dB
	800 MHz		-0.3	_____	+0.3	dB
	900 MHz		-0.3	_____	+0.3	dB
	1000 MHz		-0.3	_____	+0.3	dB
	1100 MHz		-0.3	_____	+0.3	dB
	1200 MHz		-0.3	_____	+0.3	dB
	1300 MHz		-0.3	_____	+0.3	dB
	1400 MHz		-0.3	_____	+0.3	dB
	1500 MHz		-0.3	_____	+0.3	dB
	1600 MHz		-0.3	_____	+0.3	dB
	1700 MHz		-0.3	_____	+0.3	dB
	1800 MHz		-0.3	_____	+0.3	dB
	1900 MHz		-0.3	_____	+0.3	dB
	2000 MHz		-0.3	_____	+0.3	dB
	2200 MHz		-0.3	_____	+0.3	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
3	Frequency response	1.68				
	RF-Attenuation a_{FSIQ} = 20 dB					
	120 MHz (absolute error)		-0.2	_____	+0.2	dB
	f_{fresp}					
	1 MHz					
	10 MHz		-0.45	_____	+0.45	dB
	50 MHz		-0.45	_____	+0.45	dB
	100 MHz		-0.45	_____	+0.45	dB
	200 MHz		-0.45	_____	+0.45	dB
	300 MHz		-0.45	_____	+0.45	dB
	400 MHz		-0.45	_____	+0.45	dB
	500 MHz		-0.45	_____	+0.45	dB
	600 MHz		-0.45	_____	+0.45	dB
	700 MHz		-0.45	_____	+0.45	dB
	800 MHz		-0.45	_____	+0.45	dB
	900 MHz		-0.45	_____	+0.45	dB
	1000 MHz		-0.45	_____	+0.45	dB
	1100 MHz		-0.45	_____	+0.45	dB
	1200 MHz		-0.45	_____	+0.45	dB
	1300 MHz		-0.45	_____	+0.45	dB
	1400 MHz		-0.45	_____	+0.45	dB
	1500 MHz		-0.45	_____	+0.45	dB
	1600 MHz		-0.45	_____	+0.45	dB
	1700 MHz		-0.45	_____	+0.45	dB
	1800 MHz		-0.45	_____	+0.45	dB
	1900 MHz		-0.45	_____	+0.45	dB
	2000 MHz		-0.45	_____	+0.45	dB
	2200 MHz		-0.45	_____	+0.45	dB
			-0.45	_____	+0.45	dB
	RF-Attenuation a_{FSIQ} = 30 dB					
	120 MHz (absolute error)		-0.2	_____	+0.2	dB
	f_{fresp}					
	1 MHz		-0.45	_____	+0.45	dB
	10 MHz		-0.45	_____	+0.45	dB
	50 MHz		-0.45	_____	+0.45	dB
	100 MHz		-0.45	_____	+0.45	dB
	200 MHz		-0.45	_____	+0.45	dB
	300 MHz		-0.45	_____	+0.45	dB
	400 MHz		-0.45	_____	+0.45	dB
	500 MHz		-0.45	_____	+0.45	dB
	600 MHz		-0.45	_____	+0.45	dB
	700 MHz		-0.45	_____	+0.45	dB
	800 MHz		-0.45	_____	+0.45	dB
	900 MHz		-0.45	_____	+0.45	dB
	1000 MHz		-0.45	_____	+0.45	dB
	1100 MHz		-0.45	_____	+0.45	dB
	1200 MHz		-0.45	_____	+0.45	dB
	1300 MHz		-0.45	_____	+0.45	dB
	1400 MHz		-0.45	_____	+0.45	dB
	1500 MHz		-0.45	_____	+0.45	dB
	1600 MHz		-0.45	_____	+0.45	dB
	1700 MHz		-0.45	_____	+0.45	dB
	1800 MHz		-0.45	_____	+0.45	dB
	1900 MHz		-0.45	_____	+0.45	dB
	2000 MHz		-0.45	_____	+0.45	dB
	2200 MHz		-0.45	_____	+0.45	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
3	Frequency response	1.68				
	RF-Attenuation					
	a_{FSIQ} = 40 dB					
	120 MHz		-0.2	_____	+0.2	dB
	(absolute error)					
	f_{fresp}					
	1 MHz		-0.45	_____	+0.45	dB
	10 MHz		-0.45	_____	+0.45	dB
	50 MHz		-0.45	_____	+0.45	dB
	100 MHz		-0.45	_____	+0.45	dB
	200 MHz		-0.45	_____	+0.45	dB
	300 MHz		-0.45	_____	+0.45	dB
	400 MHz		-0.45	_____	+0.45	dB
	500 MHz		-0.45	_____	+0.45	dB
	600 MHz		-0.45	_____	+0.45	dB
	700 MHz		-0.45	_____	+0.45	dB
	800 MHz		-0.45	_____	+0.45	dB
	900 MHz		-0.45	_____	+0.45	dB
	1000 MHz		-0.45	_____	+0.45	dB
	1100 MHz		-0.45	_____	+0.45	dB
	1200 MHz		-0.45	_____	+0.45	dB
	1300 MHz		-0.45	_____	+0.45	dB
	1400 MHz		-0.45	_____	+0.45	dB
	1500 MHz		-0.45	_____	+0.45	dB
	1600 MHz		-0.45	_____	+0.45	dB
	1700 MHz		-0.45	_____	+0.45	dB
	1800 MHz		-0.45	_____	+0.45	dB
	1900 MHz		-0.45	_____	+0.45	dB
	2000 MHz		-0.45	_____	+0.45	dB
	2200 MHz		-0.45	_____	+0.45	dB
4	Display linearity	1.70				
	a_{ATT}					
	16 dB		-	Reference	-	-
	18 dB		-2.15	_____	-1.85	dB
	20 dB		-4.15	_____	-3.85	dB
	22 dB		-6.15	_____	-5.85	dB
	24 dB		-8.15	_____	-7.85	dB
	26 dB		-10.15	_____	-9.85	dB
	28 dB		-12.15	_____	-11.85	dB
	30 dB		-14.15	_____	-13.85	dB
	32 dB		-16.15	_____	-15.85	dB
	34 dB		-18.15	_____	-17.85	dB
	36 dB		-20.15	_____	-19.85	dB
	38 dB		-22.15	_____	-21.85	dB
	40 dB		-24.15	_____	-23.85	dB
	42 dB		-26.15	_____	-25.85	dB
	44 dB		-28.15	_____	-27.85	dB
	46 dB		-30.15	_____	-29.85	dB
	48 dB		-32.15	_____	-31.85	dB
	50 dB		-34.15	_____	-33.85	dB
	52 dB		-36.15	_____	-35.85	dB
	54 dB		-38.15	_____	-37.85	dB
	56 dB		-40.15	_____	-39.85	dB

Item No.	Characteristic	Test to page	Min. value	Actual value	Max. value	Unit
5	Attenuator	1.71				
	a_{ATT}					
	40		-40.1	_____	-39.9	dBm
	30		-30.1	_____	-29.9	dBm
	20		-20.1	_____	-19.9	dBm
	10		-10.1	_____	-9.9	dBm

Contents - Chapter 2 "Adjustment"

2 Adjustment 2.1

2 Adjustment

All boards have been adjusted before being supplied and do not require readjustment after a board replacement in the instrument.
The correction and setting data for the boards are contained in an EEPROM on each board and are thus replaced with board replacement.

Switch off the instrument before replacing a board.

Some boards provide additional adjustment facilities which should be checked with servicing:

- Fracsyn: adjustment for calibration level -40dBm
- RF-Converter Unit: adjustment of the YIG oscillator characteristic and dynamic
- MW-Converter Unit: adjustment of the YIG filter characteristic and dynamic
- 2nd IF-Converter: no adjustment
- IF filter: no adjustment, all values are determined with calibration
- Detector: no adjustment
- LowPhaseNoise: no adjustment

Adjustment of the reference frequency is explained in Section 8 (Maintenance) of the Operating Manual.

Contents - Chapter 3 "Function Description/Selftest"

3 Function Description/Selftest

Function Description of Overall Instrument **3.1**
Modules of the Analog Unit 3.1
Modules of the Digital Unit 3.1
Description of the Analog Unit 3.2
Processor Structure 3.3
Tasks of the Level Transputer 3.3
Tasks of the Frequency Transputer 3.3
Monitoring the Function of the FSIQ **3.4**
Switch-on Test 3.4
Monitoring of the Synthesizers and Signal Levels 3.4
Error Messages of the Synthesizer 3.5
Overload Messages 3.5
Selftest **3.6**
Operation 3.6
Testing the Processor Functions 3.6
Testing the Synthesizers 3.6
Testing the Signal Path 3.7

3 Function Description/Selftest

This chapter describes the design of the FSIQ and simple measures for monitoring the function of the instrument. A selftest is available for troubleshooting and diagnosis.

The firmware update and the installation of options are described in chapter 4 in this service manual.

Function Description of Overall Instrument

This section informs on the theory of operation of this instrument.

Modules of the Analog Unit

All modules of the analog unit contain an individually programmed EEPROM indicating the model and correction data, such as frequency response, filter parameters, insertion gain. The analog unit consists of the following modules:

- RF modules with RF converter and YIG sampler forming part of the RF module
- MW converter modules (for instruments with a frequency range > 7 GHz)
- 2nd IF converter
- IF filter
- Digital IF
- I/Q-demodulator
- Fracsyn with static transputer module
- Low phase noise
- Detector board with dynamic transputer module and DSP module
- Analog motherboard

Modules of the Digital Unit

The boards of the digital unit do not contain any particular correction data. The digital unit is independent of the type of instrument, the only difference is the amount and type of plug-in boards fitted such as network board or IEC/IEEE board. The digital unit consists of the following modules:

- Main processor
- Graphic board
- Digital motherboard (containing the interface drivers such as IEC bus, LPT and COM)
- Hard disk
- Floppy disk
- LC display
- Keypad
- VGA board
- Option 2nd IEEE-bus
- Option LAN interface

Description of the Analog Unit

The FSIQ has been conceived as analyzer with triple conversion. Special importance has been attached to reaching high display dynamics, i.e., the individual amplifier stages have not only been trimmed to minimum displayed noise level but adjusted such that they provide good intermodulation characteristics with an acceptable noise factor.

The input signal passes a switchable input divider (attenuation range 0 to 70dB in steps of 10dB), which also switches the internal calibration and test signal.

In the RF converter, the signal (7.9414 to 14.9414 GHz ;FSIQ3: 4,3414 to 7,8414GHz) is converted to the 1st IF (7.9414, FSIQ3: 4.3414)), using the 1st LO after having passed the input lowpass in the 1st mixer. Following the 1st IF filter and the IF gain, the signal is converted to the 2nd IF of 741.4MHz.

By those FSIQ models having a frequency range greater than 7 GHz, the signal is divided, after the input divider, in a switchable diplexer. The portions of the signal below 7 GHz are further processed in the RF converter. The portions of the signal above 7 GHz are fed via a YIG filter to the MW converter. The conversion of the IF of 741.4 MHz takes place in this module. The LO required for the conversion comes from the RF converter and, depending on the frequency range, is either fed directly or via a doubler to the mixer.
The next module in the signal path is the 2nd IF Converter, which provides for conversion of the second IF to the third IF of 21.4 MHz and generation of the second and third LO. Apart from several amplifiers it contains a filter on 741.4 MHz with a 3-dB bandwidth of 10 MHz. This filter serves as resolution filter if the resolution bandwidth is 10 MHz and it reflects the image frequency which might be generated by the third conversion.

The resolution filters for bandwidths between 1 kHz and 5 MHz are located on the IF filter board . With the 10-MHz bandwidth, the filter stages of the board are bypassed. Crystal filters are used for bandwidths between 1 and 30 kHz, LC filters are provided for bandwidths of 50 kHz or above. The individual filter stages have been decoupled from each other by means of amplifiers which is why they act as Gaussian filter. Subsequent to the first two filter stages, switchable IF amplifiers (Step Gain) and two independent calibration amplifiers are fitted. The step gain can be switched in 0.1-dB steps from 0 to 50 dB and is used to amplify the signal on the reference level. One of the two calibration amplifiers is used to compensate for the deviations of amplification with different bandwidth or step-gain settings. This amplifier is controlled via the serial interface of the level transputer and a D/A converter on the IF filter board. The second calibration amplifier is controlled by an analog voltage, which is modified by the frequency transputer during the sweep according to the frequency response of the input stages.

The IF filters are followed by the log module, which provides for a dynamic of 110 dB. The video signal thus created is passed to the detector board. There, it is through-connected to the rear panel.
If resolution bandwidths are < 1kHz, the signal path via the log module remains unused. The signal is still filtered by the IF filter board to a bandwidth of 3 kHz, but then converted to a 25-kHz IF and filtered digitally on the module. An 18-bit A/D converter is provided on the digital IF for sampling with the 25-kHz IF.

A measuring A/D converter with a sampling rate of 20 MHz is provided on the detector board. Due to the high sampling rate of the A/D converter the analog peak detectors are not required, they are digitally simulated following the converter. Video filtering is carried out digitally, too, in the noise filter gate-array on the detector board. For video bandwidths ≤ 20 kHz, additional filtering is carried out using a DSP, which remains disabled above 20 kHz.

Processor Structure

Apart from a pentium-CPU, the FSIQ is provided with four T805-32-bit transputers and a 16-bit transputer T225. Two DSPs are provided in the basic instrument for digital signal processing.

The pentium-CPU controls the complete data exchange with the periphery, such as keybaord entry, representation of the softkeys and operation via the IEC bus. The transputers independently control the test procedure, calculate correction factors and display the measuring curve on the screen. The transputers are provided with the current instrument settings by the pentium-CPU via a link adapter, which connects the ISA bus of the CPU board with a transputer link of the T805 on the graphic board (called GTP = graphic transputer in the following). Other transputer links couple the T225 and one T805 on the graphics board and the two T805 on the detector board (LTP = level transputer) and the Fracsyn (FTP = frequency transputer) to the GTP. T225 is exclusively used as interface between the GTP and the chipset for graphics.

Tasks of the Level Transputer

The PTP receives the level-dependent settings from the graphic transputer and causes the corresponding switchovers in the hardware to be made via a serial interface. The PTP has the following functions: making the level-dependent settings such as attenuation of the attenuator, the bandwidths on the IF filter and level correction with the calibration frequency (120 MHz) and, on the other hand, programming of the DSPs, obtaining the measured values and passing the measured values to the graphic transputer via the transputer link. To meet these requirements, the PTP is provided with its individual serial bus to those boards which require level-dependent settings. I.e., the modules IF filter, digital IF, attenuator control board.

Tasks of the Frequency Transputer

The FTP receives the current sweep setting from the graphic transputer via the PTP and calculates the required synthesizer settings. For settings which have to be made during a sweep, the FTP is fitted with a fast parallel bus on the fracsyn module, which also addresses the sweep synthesizer. The subsequent settings have to be made: the frequency-dependent level correction, coarse tuning of the YIG oscillator and control of the sweep output. The fracsyn module therefore accommodates D/A converters which are programmed parallely during the sweep and which provide control voltages. The voltage for the sweep output is applied to the rear panel where it provides a sawtooth voltage which starts at 0V at the sweep start and increases to 10 V at the end of sweep. The voltage for frequency-response correction is passed to a voltage-controlled amplifier on the IF filter board which compensates for the frequency-dependent attenuation characteristic of the input stages. The third tuning voltage leads to the RF module where the main coil of the YIG oscillator which is integrated in the YIG sampler is controlled by means of a voltage-controlled current source, thus controlling the coarse tuning of the first LO. D/A converters which are required for options are provided in the basic FSIQ model. A serial bus is available for the FTP to use when controlling time-critical settings.

Monitoring the Function of the FSIQ

Switch-on Test

Following switch-on of the instrument a selftest of the processor functions is executed first. Subsequently, the transputer net is initialized, which adopts control of the analog modules.

Monitoring of the Synthesizers and Signal Levels

The FSIQ is provided with a large amount of selftest points which can be switched to an A/D converter via multiplexer. Most of these test points are located on the analog modules and, by means of level detectors, allow for monitoring the levels in the signal path, the output levels of the LO drivers and the tuning voltages of the oscillators. The selftest voltages which are required for proper functioning, are additionally monitored by comparators. The output signals of these comparators are stored and checked by the level transputer during each request of a measured value. If one of these comparators responds, one of the following error messages is output:

Message	**Meaning**	**see Section**
Reference unlock	Reference osxillator not synchronized	"Error Messages of the Synthesizer"
LO UNL	First LO not synchronized	"Error Messages of the Synthesizer"
2nd/3rd LO unlock	Second and third LO not synchronized	"Error Messages of the Synthesizer"
Level 1st LO	LO level at first mixer too small	"Error Messages of the Synthesizer"
Level 2nd LO	LO level at second mixer too small	"Error Messages of the Synthesizer"
Level 3rd LO	LO level at third mixer too small	"Error Messages of the Synthesizer"
OVLD	Input signal too large	"Overload Messages"
IF OVLD	Signal following IF amplifier too large	"Overload Messages"

Error Messages of the Synthesizer

When the message LO UNL is displayed, the instrument continues operating, however, the signals indicated may have been shifted on the frequency axis. In particular, when the instrument is operated at about the maximum or minimum operating temperature, it may occur, after ageing of the instrument, that the tuning voltage of the voltage-controlled oscillators drift at the limit of the permitted range. Therefore, correction of the pretuning is provided for the first LO (YIG oscillator) and the third LO (VCO) which is performed during total calibration of the instrument, thus eliminating the error. Correction is not required for the second LO, since it is obtained by multiplication of the third LO. For measuring accuracy reason, it is recommended with very cold or hot environment to call the total calibration of the instrument (after a warm-up period of at least 30 minutes).

When the message "Reference unlock" is output and if the analyzer is set to external reference, check that the latter is applied with the correct frequency and sufficient level at connector EXT REF IN/OUT. If the instrument is set to internal reference, the message should only occur during a short warm-up phase following switch-on.
The message Level Lo means that the level at the LO gate of one of the mixers is too low, which may lead to dips in the conversion attenuation. In any case, this message indicates a fault inside the instrument.

Overload Messages

The messages OVLD and IF-OVLD indicate an overload in the signal path of the instrument. These messages are a warning that the instrument indication will seem to be wrong, because one stage in the signal path is operated with the 1-dB compression or above.
The message OVLD indicates that one stage preceding the variable IF amplifier is operated with an exceeded level. The level can only be reduced by an increased attenuation of the input attenuator (RF Attenuation). Overload at the input mixer and in the subsequent stages frequently occurs, if pulsed or highly modulated signals are applied. Such signals have a high peak value compared to the input bandwidth and this may lead to compression of these stages.
If this message is output without an input signal being applied, the input mixer is defective. The LO feedthrough (= the level display with input frequency zero) depends to a large extent on the balance of the input mixer. Since a partially faulty mixer becomes very unbalanced, thus providing very high LO feedthrough, this may lead to overload of the subsequent stages and thus to output of the message OVLD.
The message IF-OVLD indicates compression in one stage following the switchable IF amplifier. This can be remedied even with fixed input attenuation by increasing the reference level. In analyzer mode, the IF amplification depends on the reference level and the RF attenuation.

Selftest

The selftest allows for checking the instrument functions without using additional test instruments. When an instrument error occurs, the module which caused the error is indicated on the screen. The following measures are taken to localize an error:

- An additional A/D converter is provided which allows for measuring voltages on the various modules.
- While the selftest is being performed, important dc voltages, on-board supply voltages and amplifier operating points are measured and compared to their rated values.
- Level detectors check the oscillator levels required for operating the mixers
- The calibration generator generates a 120-MHz signal with a level of 0 dBm at the RF input of the instrument. The on-board level detectors in the signal path allow for processing of the input signal in the individual RF and IF stages.

Operation

Operation of the selftest is explained in the Operation Manual , Chapter 2, Section "Selftest Functions".

Testing the Processor Functions

The test of the processor functions comprises testing of the interface chips and the dynamic RAM, test of the graphic board and the connected transputers.
If the CPU, the dynamic RAM or the hard disk are defective, the instrument may not be able any more to output a detailed error message.

Testing the Synthesizers

Correct functioning of all oscillators is absolutely necessary for checking the signal path. Therefore, all synthesizer modules are checked next. The synthesizer modules are tested in the following order:

1. Test of the reference frequencies with 10 MHz and 120 MHz and the derived signals with 20, 30 and 60 MHz.
2. Measurement of the signals applied to the YIG sampler (output signal of fracsyn and output signal of sampler)
3. Test of the YIG main loop with the cutoff frequencies by measuring the YIG tuning voltage
4. Check of the LO levels and of the operating points of the LO drivers

In case of an error the selftest is aborted since it does not make sense measuring the signal path if e.g., no LO level is provided.

Testing the Signal Path

Subsequently, the modules in the signal path are checked. The fracsyn module accommodates a 120-MHz calibration generator, the output power of which is checked using individual test points. This signal is connected into the signal path via a changeover switch in the input attenuator of the FSIQ. The test sequence is as follows:

1. Check of the RF attenuator
2. Check of the RF converter by testing the operating points of the amplifiers
3. Check of the 2nd IF converter by testing the operating point of the amplifier for the second IF and reading out of the level detectors in the signal path.
4. Check of the IF filters by testing the supply voltages for the individual filter circuits, the tuning voltages for the filter bandwidths and the level detectors.
5. Check of detector board

Though the selftest provides high measuring depth, it cannot be assumed that the module which has been found out to be faulty is always really faulty. A faulty cable, e.g., has the same effect as an interrupt in the input attenuator. Therefore, have the faulty function checked by an R&S servicing shop when an error message occurs.

Contents - Chapter 4 "Software Update/Installing Options"

4 Software Update/Installing Options

New Installation of the FSIQ Software 4.1

Installing the Options 4.2

4 Software Update/Installing Options

This chapter contains information on extension and modification of the FSIQ. Additional manuals obtained together with a software/firmware update or with subsequently acquired options can be filed here.

New Installation of the FSIQ Software

The installation of a new firmware version can be performed using the built-in diskette drive. The firmware update kit contains several diskettes.
The installation program is called up in the *SETUP* menu.

CONFIGURATION SETUP sidemenu:

The *FIRMWARE UPDATE* softkey starts the installation program and leads the user through the remaining steps of the update

Performing the update:

- Insert diskette 1 into the drive.
- Press the *SETUP* key.
- Press the menu change key .
  The *SETUP* side menu is called
- Press the *FIRMWARE UPDATE* key.
  The update is started.

The *RESTORE FIRMWARE* softkey restores the previous firmware version

Installing the Options

The following options are available with the FSIQ:

7 GHz Frequency Extension for FSIQ3	FSIQ-B2	1073.5044.02
Tracking Generator 3.5 GHz	FSE-B8	1066.4469.02
Tracking Generator 3.5 GHz with I/Q Modulator	FSE-B9	1066.4617.02
Tracking Generator 7 GHz	FSE-B10	1066.4769.02
Tracking Generator 7 GHz with I/Q Modulator	FSE-B11	1066.4917.02
Switchable Attenuator for Tracking Generator	FSE-B12	1066.5065.02
External Mixer Output for FSIQ26 and FSIQ40	FSE-B21	1084.7243.02
Ethernet Interface 15-contact AUI connector	FSE-B16	1073.5973.02
Thin-wire BNC connector	FSE-B16	1073.5973.03
2nd IEC/IEEE Bus Interface	FSE-B17	1066.4017.02

For retrofitting, please note the mounting instructions enclosed with the options.
These mounting instructions can be filed at this place in the service manual and are thus easily available whenever they are required.

Caution!

Disconnect the instrument from the mains before opening the casing. Also note the safety instructions at the beginning of this manual.

The components used in the instrument are sensitive to electrostatic discharges which is why they are to be dealt with according to the ESD regulations.

When installing hardware options note the following:

- Switch off instrument and pull the mains plug.
- Unscrew the rear feet on left and right
- Push the top and bottom cover backwards using a thin screwdriver.
- After installing the option replace the tube and fasten the rear panel feet again.

Caution!

When replacing the covers take care not to damage or pull off cables.

- Switch on FSIQ.
- Install additional software, if supplied, according to the instructions enclosed with the option.
- If an adjustment is required for this option, the appropriate hints are to be found in the installation instructions for the option.

Contents - Chapter 5 "Documents"

5 Documents

Shipping of Instrument and Ordering of Spare Parts 5.1
Shipping of Instrument 5.1
Shipping of a Module 5.1
Ordering Replacement Parts 5.2
Replaced Modules 5.2
Ordering and Delivery of Replaced Modules 5.2
Taking back Defective Replaced Modules 5.2

Cable Exchange 5.3
Available Power Cables 5.3

Documents for FSIQ 5.5

5 Documents

This chapter provides information on the ordering of spare parts and contains the documents for the FSIQ basic unit. The replacement of modules and the spare part list is described in the service manual, order number 1065.6016.24 (not included).

Shipping of Instrument and Ordering of Spare Parts

Please contact your Rohde & Schwarz support center or our spare parts express service if you need service or repair of your equipment or to order spare parts and modules.

The list of the Rohde & Schwarz representatives and the address of our spare parts express service are provided at the beginning of this service manual.

We require the following information in order to answer your inquiry fast and correctly and to decide whether the warranty still applies for your instrument:

- Instrument model
- Serial number
- Firmware version
- Detailed error description in case of repair
- Contact partner for checkbacks

Shipping of Instrument

When shipping the instrument, be careful to provide for sufficient mechanical and antistatic protection

➢ Repack the instrument as it was originally packed when transporting or shipping. The two protective caps for the front and rear panels prevent the control elements and connectors from being damaged. The antistatic packing foil avoids any undesired electrostatic charging to occur.

➢ If you do not use the original packaging, provide for sufficient padding to prevent the instrument from slipping inside the package. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

Shipping of a Module

When shipping a module, then, also be also careful to provide for sufficient mechanical and antistatical protection

➢ Ship the module in a sturdy, padded box.

➢ Wrap the board into antistatic foil.
If the packaging is only antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the enclosed packaging is conductive.
Exception: If the module contains a battery, the tightly fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

Ordering Replacement Parts

To deliver replacement parts promptly and correctly we need the following indications:

- Stock number (see component lists in this chapter)
- Designation
- Component number according to component list
- Number of pieces
- Instrument type the replacement part belongs to
- Contact person for possible questions

The stock numbers necessary for ordering replacement parts and modules as well as power cables can be found further down.

Replaced Modules

Replaced modules are an economic alternative for original modules. It should be kept in mind that replaced modules are not new, but repaired and fully tested parts. They may have traces from use but they are electrically and mechanically equivalent to new modules.

To find out which replaced modules are available, please refer to your Rohde & Schwarz representative (or to the central service division, Rohde & Schwarz Munich).

Ordering and Delivery of Replaced Modules

For ordering replaced modules, the same indications as for ordinary parts are required.

Taking back Defective Replaced Modules

Defective modules of the replacement program which can be repaired are taken back within **3 months** after delivery of the replaced module. A repurchasing value is credited.

Excluded are parts which can not be repaired, e.g. PCBs that are burnt, broken or damaged by repair attempts, incomplete modules, parts which are heavily damaged mechanically.

The defective parts must be sent back with a **returned accompanying document** containing the following information:

- Stock number, serial number and designation of the dismounted part,
- **Precise** description of the error,
- Stock number, serial number and designation of the instrument the part was dismounted from,
- Date of dismounting,
- Name of the technician who exchanged the part.

A returned accompanying document is provided with each replacement module.

Cable Exchange

Table 5-1 at lists all power cables available. The stock numbers necessary for ordering replacement parts and modules can be found in the component lists further down.

Important Note!

When replacing a module please note the safety instructions and the repair instructions given in chapter 3 and at the beginning of this service manual.

Available Power Cables

Table 5-1 List of power cables available

Stock No.	Earthed-contact connector	Preferably used in
DS 006.7013	BS1363: 1967' complying with IEC 83: 1975 standard B2	Great Britain
DS 006.7020	Type 12 complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 006.7036	Type 498/13 complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 006.7107	Type SAA3 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365 DS 0099.1456	DIN 49 441, 10 A, 250 V, angular DIN 49 441, 10 A, 250 V, straight	Europe (except Switzerland)

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ROHDE&SCHWARZ

Documents for FSIQ

Overall Instrument

Circuit Diagram

Motherboard:

Circuit Diagram

A20
FRONTEINHEIT

A50
CONVERTER

ILLU

A400
LCD

W400 18

FRONTKEYS

X2
X5
X1
A41
DISPLAY BOARD
X6
X8
X3 X10

to Sheet2
to Motherb. Dig.
64 W41

W102
3

ON/STDBY

X2 PROBE/
CODE
12 ONLY MOD3,13,7,17,26,27,40

FLOPPY DRIVE
A390

W104
2
to Motherboard
Digital
Sheet2
34 W103

X4 PROBE
POWER
W101
3

AF VOLUME
W111
ONLY MOD7,17,26,27

3
X23
X21
X13
X11
LCDBUS
X200
X220
X120
X130
X140

X8 AF OUT
ONLY MOD3,13,7,
17,26,27,40

X14

X15

B1
ONLY MOD3,13,7,
17,26,27,40
2

W32

X3 GEN OUT
(OPTION)
W43

OPTION
FSE-B12
TG ATTENUATOR

W44
W2
W150
10

A60
ATTENUATOR
FOR
MOD3,13,7,17,63
(1067.7755.03)
FOR
MOD26,27,73
(1046.5024.04)
X2
X3
X1

A60 ATTENUATOR UNIT
A61
A62
K60
FOR MOD40
(1088.4229.02)

X1 RF IN
W1
ONLY MOD26,27,40,73

EXT. MIX
LO OUTPUT

EXT. MIX
IF INPUT

FRONT
PANEL

W60
ONLY MOD3,13,7,17
3

ONLY MOD3,13,7,17,63
W2

OPTION
FSE-B13
X2
X1
1dB ATTENUATOR

W61
ONLY MOD3,13,7,17
3

W61

W3

MOD26,27,40,73

X7
A70 DIPLEXER
ONLY MOD26,27,40,73
X4
X6
X5

W52
3

MOD26,27,40,73
W52

W60
MOD26,27,40,73

OPTION
FSE-B13
X2
X1
1dB ATTENUATOR

MOD26,27,40,73

A80
IN
YIG FILTER
OUT
ONLY MOD26,27,40,73

MOD26,27,40,73
W50

W51
MOD26,27,40,73

W72
X221
A220
DR FILTER
ONLY MOD 7,17,26,27,40,73
X222

W14

W47
1

W53
W4 ONLY MOD3,13,63
W5
W20
W19
W18
W21
W17
W7
W6
W3

X125 72MHZ IN
X122 FRAC SYN
X121 INTERPOL OUT
X128 10MHZ REF OUT
X123 SAMPLE OUT
A120
LOW PHASE
NOISE + OCXO
ONLY MOD3,13,
7,17,26,27,40
X120

X21 1ST LO OUT
X131 2ND LO IN
X132 2ND IF OUT
X133 SAMPLE IN
X139 YIG CON
X134 IF SYN
X137 RF IN
A130
RF MODULE UNIT
X130

X143 IF IN
X148 10MHZ REF IN
X141 INTERPOL IN
X149 YIG CON
X142 FRAC SYN
X147 EXT REF I/O
X145 20MHZ OUT
X144 120MHZ OUT
X146 CAL OUT
A140
FRAC-SYN
X140

X218 RF IN
X217 YIF TUNE
X219 DIPLEXER
MOD26,27,40
A210
MW CONV

FUER DIES
BEHALTEN WIR UNS
ERLAGE
RECHTE VOR

REAR PANEL

X66 TG I IN
X64 TG Q IN
X71 EXT REF I/O
X70 CCVS OUT
X62 21.4 MHz OUT
X61 LOG VIDEO OUT
X72 EXT TRIG/GATE

W28 W29 W14 W10 W13 W24 W16 W25 W15 W31 W30 W48 W12 W9 W11 W26 W22 W23 W32

ONLY MOD63,73

ONLY MOD3,13, 7,17,26,27,40

64

OPTION EXT. MIXER FSE-B21

A150 2ND IF-CONVERTER

A110 OPTION TRACKING GENERATOR

A160 IF-FILTER

A171 I/Q Data Interface

A170 I/Q-DEMODULATOR

ONLY MOD 3,7,13,17,26,27,40

A180 DIG. IF

OPTION A191 FSIQ-B70

A190 DETECTOR

to Sheet2 PS ANALOG

to Sheet2 PS DIGITAL

X16 PSAUTO X18 X17 X19

64 to Sheet2 Motherb. Dig.

A10 MOTHERBOARD ANALOG

ANGABEN UEBER ENTSPRECHENDE BAUGRUPPEN (VAR)
SIEHE SCHALTTEILLISTE

FOR SPECIAL INFORMATION ON CIRCUIT BOARDS (MOD)
SEE PARTS LIST

VARIANTENERKLAERUNG:
IDENTIFICATION OF MODELS

MOD03= FSIQ3 OLD
MOD13= FSIQ3 NEW

MOD07= FSIQ7 OLD
MOD17= FSIQ7 NEW

MOD26= FSIQ26 OLD
MOD27= FSIQ26 NEW

MOD40= FSIQ40

MOD63= FSIG3

MOD73= FSIG13

OPTIONS

1. FSE-B8 Tracking Generator
2. FSE-B12 Attenuator for Tacking Generator
3. FSE-B13 1dB Attenuator
4. FSIQ-B70 Code Domain Power
5. FSE-B21 External Mixer

ONLY MOD26,27

02.04		07.11.00	RA	MEZ1	DATUM	NAME	BENENNUNG
				BEARB.		RA	FSIQ SIGNAL ANALYZER
				GEPR.		RA	
				NORM			TOP/TOP.1
				PLOTT	00-11-07	RAMSAUER	

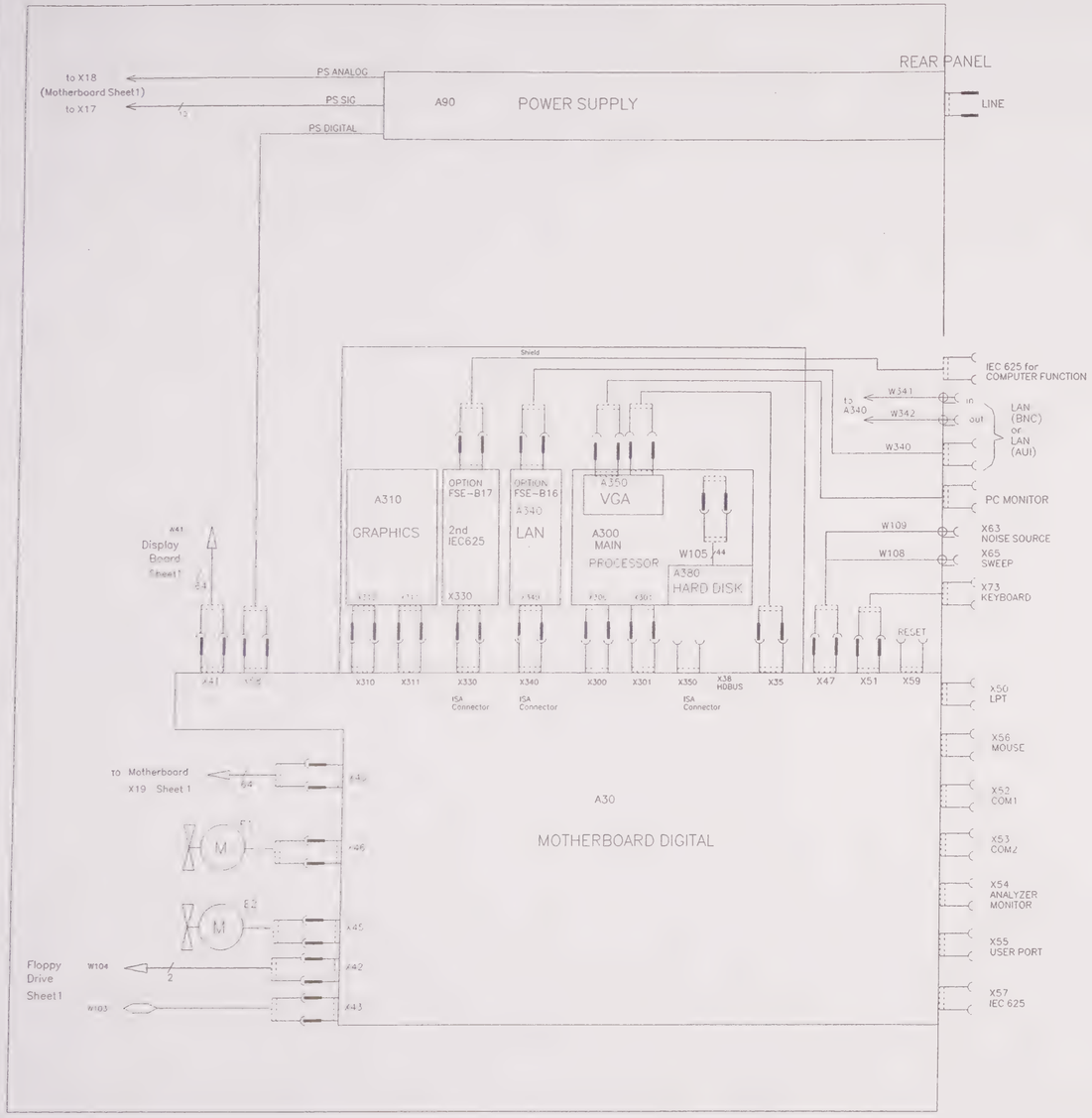
AEND. IND. | AENDERUNGS-MITTEILUNG | DATUM | NAME

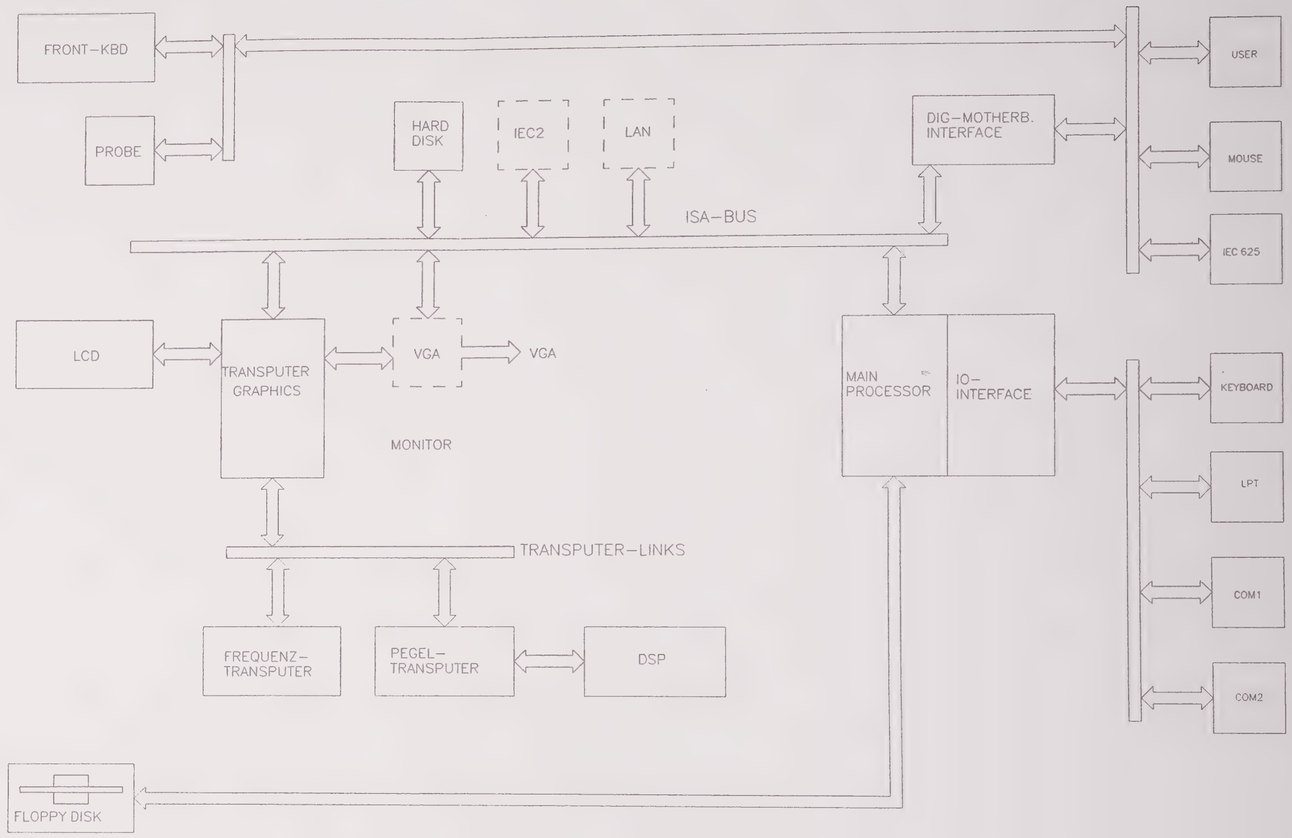
ROHDE&SCHWARZ

ZEICHN.-NR. 1119.5005.01 S

BLATT-NR 1 + V 5 BL.

ZU GERAET FSIQ | REG.I.V. 1119.5005.01 | ERSTE Z. *





ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES
REQUIRE A SPECIAL HANDLING

02.04		07.11.00	RA	MEZ1	DATUM	NAME
				BEARB.		RA
				GEPR.		RA
				NORM		
				PLOTT	00-11-07	RAMSAUER

AEND. IND. | AENDERUNGS-MITTEILUNG | DATUM | NAME

ROHDE&SCHWARZ

ZU GERAET FSIQ

BENENNUNG

FSIQ SIGNAL ANALYZER

TOP/TOP.2

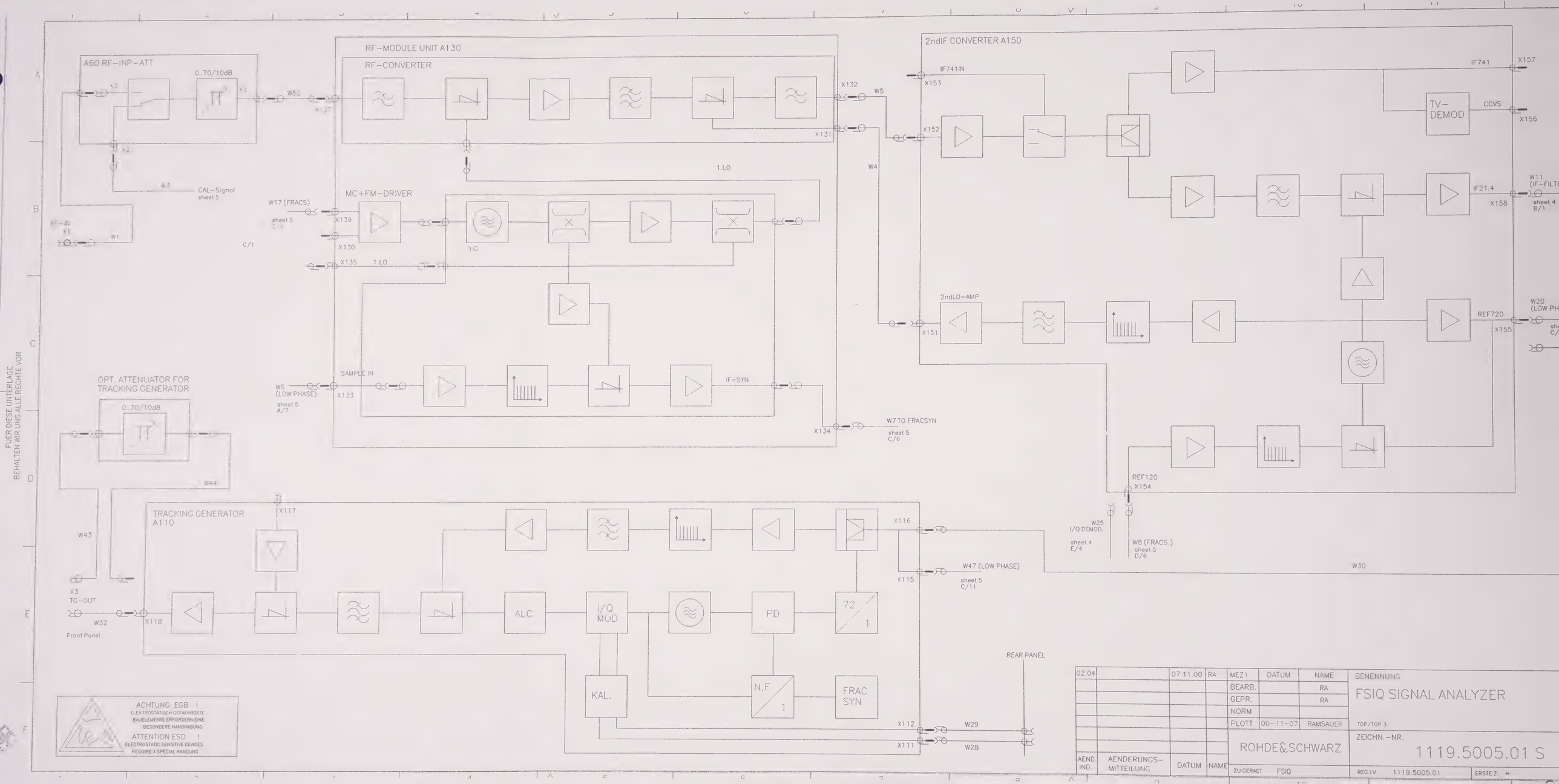
ZEICHN.-NR.

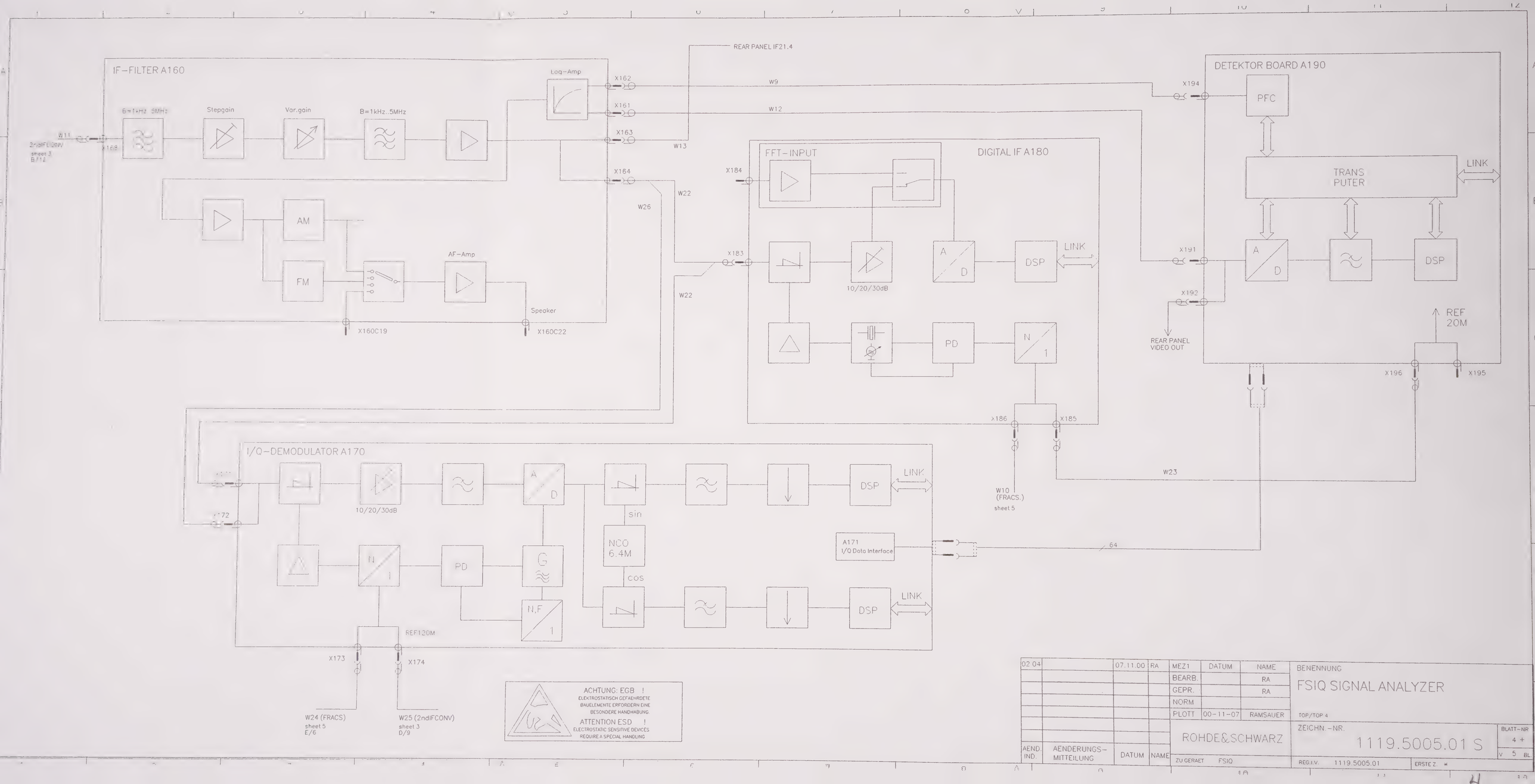
1119.5005.01 S

BLATT-N 2

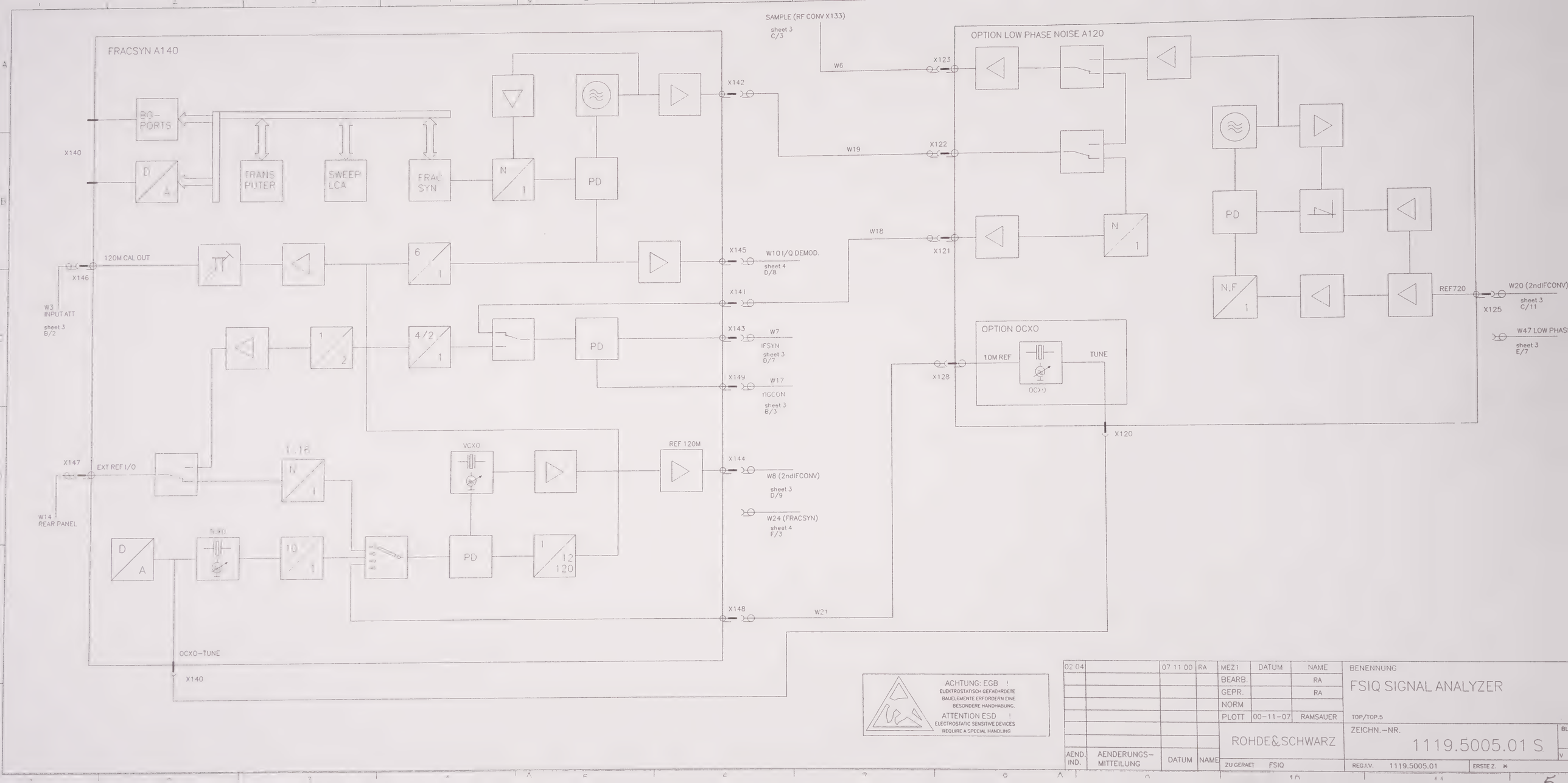
V 5

REG I.V. 1119.5005.01 | ERSTE Z.


A60 RF-INP-ATT
0..70/10dB
X3
X1
X2
W52
X137
W3
CAL-Signal
sheet 5
RF-MODULE UNIT A130
RF-CONVERTER
X132
X131
W5
W4
1.LO
MC+FM-DRIVER
W17 (FRACS)
sheet 5
C/5
X139
X130
X135
1.LO
YIG
C/1
2ndIF CONVERTER A150
IF741IN
X153
X152
IF741
X157
TV-
DEMOD
CCVS
X156
IF21.4
X158
W11
(IF-FILTE
sheet 4
B/1
2ndLO-AMP
X151
REF720
X155
W20
(LOW PH
OPT. ATTENUATOR FOR
TRACKING GENERATOR
0..70/10dB
W44
SAMPLE IN
W6
(LOW PHASE)
sheet 5
A/7
X133
IF-SYN
X134
W7 TO FRACSYN
sheet 5
C/6
REF120
X154
W25
I/Q DEMOD.
sheet 4
E/4
W8 (FRACS.)
sheet 5
D/6
W30
TRACKING GENERATOR
A110
X117
W43
X116
W47 (LOW PHASE)
sheet 5
C/11
X115
X3
TG-OUT
W32
X118
Front Panel
ALC
I/Q
MOD
PD
72
1
KAL.
N.F
1
FRAC
SYN
REAR PANEL
X112
X111
W29
W28
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES
REQUIRE A SPECIAL HANDLING
FUER DIESE UNTERLAGE
BEHALTEN WIR UNS ALLE RECHTE VOR
02.04
07.11.00
RA
AEND. IND.
AENDERUNGS-
MITTEILUNG
DATUM
NAME
MEZ1
DATUM
NAME
BEARB.
RA
GEPR.
RA
NORM
PLOTT
00-11-07
RAMSAUER
BENENNUNG
FSIQ SIGNAL ANALYZER
TOP/TOP 3
ROHDE&SCHWARZ
ZEICHN.-NR.
1119.5005.01 S
ZU GERAET FSIQ
REG.I.V. 1119.5005.01
ERSTE Z. *



02.04		07.11.00	RA	MEZ1	DATUM	NAME	BENENNUNG
				BEARB.		RA	FSIQ SIGNAL ANALYZER
				GEPR.		RA	
				NORM			TOP/TOP 4
				PLOTT	00-11-07	RAMSAUER	
AEND. IND.	AENDERUNGS-MITTEILUNG	DATUM	NAME	ROHDE&SCHWARZ			ZEICHN.-NR. 1119.5005.01 S
				ZU GERAET FSIQ			BLATT-NR 4 + V 5 BL
							REG.I.V. 1119.5005.01 ERSTE Z. *


FRACSYN A140
OPTION LOW PHASE NOISE A120
SAMPLE (RF CONV X133)
sheet 3
C/3
W6
X123
X142
W19
X122
X121
W18
BG-PORTS
X140
D/A
TRANS PUTER
SWEEP LCA
FRAC SYN
N/1
PD
120M CAL OUT
X146
W3
INPUT ATT
sheet 3
B/2
6/1
X145
W10 I/Q DEMOD.
sheet 4
D/8
X141
1/2
4/2/1
X143
W7
IFSYN
sheet 3
D/7
X149
W17
rIGCON
sheet 3
B/3
OPTION OCXO
10M REF
TUNE
OCXO
X128
X120
N,F/1
REF720
X125
W20 (2ndIFCONV)
sheet 3
C/11
W47 LOW PHAS
sheet 3
E/7
X147
EXT REF I/O
W14
REAR PANEL
1..16
N/1
VCXO
REF 120M
X144
W8 (2ndIFCONV)
sheet 3
D/9
W24 (FRACSYN)
sheet 4
F/3
10/1
1/12/120
X148
W21
OCXO-TUNE
X140
ACHTUNG: EGB !
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION ESD !
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING
02.04
07 11 00 RA
MEZ1 DATUM NAME
BEARB. RA
GEPR. RA
NORM
PLOTT 00-11-07 RAMSAUER
AEND. IND.
AENDERUNGS-MITTEILUNG
DATUM NAME
ROHDE&SCHWARZ
BENENNUNG
FSIQ SIGNAL ANALYZER
TOP/TOP.5
ZEICHN.-NR.
1119.5005.01 S
ZU GERAET FSIQ
REG.I.V. 1119.5005.01
ERSTE Z. *